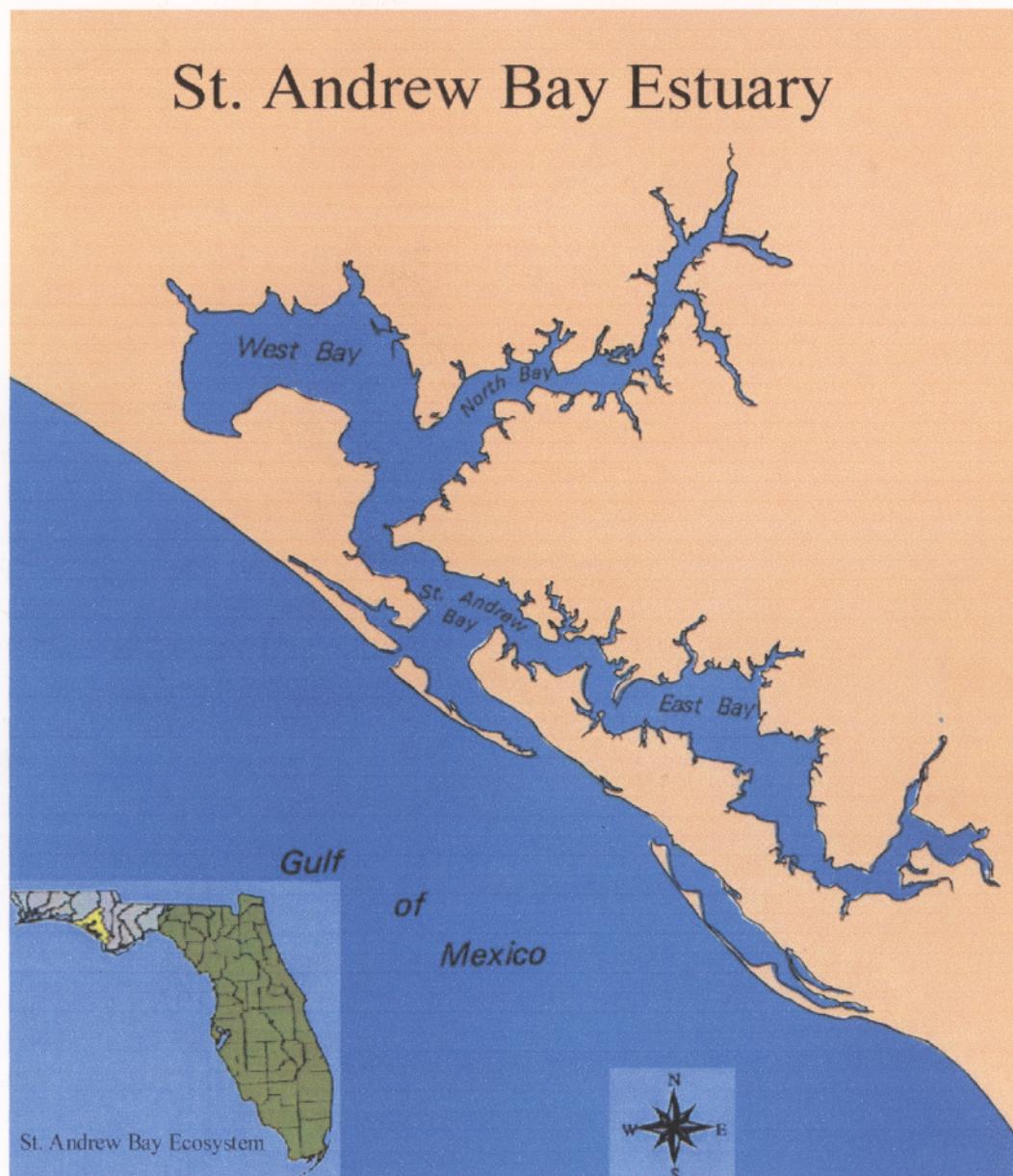


An Inventory of the Biological Resources Reported from the St. Andrew Bay Estuarine System, Bay County, Florida. A Revision.



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For:

**St. Andrew Bay Environmental Study
Team, Inc.**

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Preface

In April 1996, the St. Andrew Bay Environmental Study Team (BEST) printed and distributed the first edition of this inventory. In the ensuing seven years, additional records of plants and animals associated with the St. Andrew Bay estuary have been added to those previously reported from the estuary. The present revision was undertaken to provide additional species to the list and to place the information in a more usable form. The criteria for placing species on the lists were changed to comply with the criteria used for the "Indian River Lagoon inventory of flora and fauna". The biotic communities of the estuary are also included, as defined by the Florida Natural Areas Inventory, and the manmade substrates such as the rock jetties in the estuary are included. The writer is not knowledgeable in the taxonomy of the vast majority of the taxa of plants and animals listed herein, so a taxonomic breakdown for many groups was not possible.

The St. Andrew Bay ecosystem has been developing rapidly, particularly the 66 % of the ecosystem that is within Bay County, and it appears that this rate of human development will continue into the future. In recognition of this rapid growth there has been an attempt to plan for the maintenance of the ecosystem as a whole and the estuary contained within it. The St. Andrew Bay ecosystem was the subject of an ecosystem management plan written by BEST and the Florida Department of Environmental Protection in 1998⁹³. This plan was revised in 2001 by Keppner and Keppner¹⁰³. The Northwest Florida Water Management District produced a Surface Water Improvement Management Plan for the St. Andrew Bay drainage basin in 2000¹¹². This revised inventory of the flora and fauna of the St. Andrew Bay estuary is a part of the continuing effort of BEST, Inc. and BEST to provide information regarding the estuary to those who use, plan to use, or are involved in the management of the ecosystem and the estuary. The continued presence within the estuary of all the species listed in this inventory is, of course, unknown. There has not been an organized effort to monitor or continue to determine the species diversity of the estuary or the ecosystem. One can only hope that all the species previously reported from the estuary remain in the estuary, and those that are present but not yet recorded for the estuary will be present in the future, including species new to science.

Acknowledgements

The first edition of this inventory and this addition would not have been completed without the interest and assistance of Ms. Rosalie Shaffer of the National Marine Fisheries Service, Panama City Laboratory. Ms. Shaffer maintains a bibliography of the research on St. Andrew Bay, and has copies of all the literature in the literature cited section of this inventory. The author sincerely appreciates the help provided by Mr. John Foster of Panama City, and the Gulf Coast Research Laboratory, Ocean Springs, MS with the crustaceans specifically and the arthropods in general and his review of the manuscript. Appreciation is expressed to those who took the time to review the entire manuscript or parts of it and provide comments: Dr. Neil Lamb, Co-chair BEST Natural Resources Subcommittee; and Ms. Candis Harbison, President, BEST, Inc. Thanks also to Dr. Jeff Gore, Florida Fish and Wildlife Conservation Commission for reviewing the list of mammals and suggesting additions, and Dr. James Celic, Florida A & M, Mulrennan Arthropod Laboratory, Panama City, Florida for the mosquitos and biting flies.

Special appreciation is extended to my wife Lisa for supporting this effort, providing information, and her continuing curiosity about all living things.

Edwin J. Keppner, Ph.D, Volunteer to BEST, Inc. & Co-chair, BEST Natural Resources Subcommittee. February 2001.

The St. Andrew Bay Environmental Study Team, Inc. (BEST, Inc.)

The Bay Environmental Study Team, Inc. (BEST, Inc.) is a not-for profit 501(c)(3) Florida Corporation consisting of citizens concerned with the wise management of the natural resources of the St. Andrew Bay ecosystem. BEST, Inc. is dedicated to charitable, scientific, and educational purposes in support of its mission to evaluate the status of the St. Andrew Bay ecosystem and its watershed (including all connecting bays, bayous, and waterways and pertinent uplands that drain into it) to identify any problems and to initiate and implement corrective action.

To that end, BEST, Inc. seeks and administers funds in support of projects that provide information regarding the natural resources of the ecosystem, and serves as the financial arm of the St. Andrew Bay Environmental Study Team (BEST) proper. The information obtained by BEST, Inc. is provided to local, state, and federal decision-makers, natural resource managers, and the public through BEST. The BEST maintains a website at www.standrewbest.org.

Cover: St. Andrew Bay Estuary from the BEST Application to the National Estuary Program

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Introduction

The purpose of this document is to revise and update the previous inventory of the flora and fauna reported from the St. Andrew Bay estuary (Keppner¹⁰²). The first section is intended for those not well versed in biodiversity. It attempts to provide basic information about biodiversity, species diversity, and the place of the St. Andrew Bay ecosystem and its St. Andrew Bay estuary in the overall scheme of the biodiversity of the United States. The species lists are present to support the numbers presented in the results and discussion section and for those who may be interested in such information.

Literature citations are numbered, and those citations from the original document are in alphabetical order. Those citations added for this revision are numbered from the last number of the original document. *This document is not a taxonomic analysis, and no attempt was made by the writer to determine the current taxonomic status of the species listed, correct nomenclature, correct spelling, or alter those taxa reported by the authors cited.* Those interested in the taxonomic details are encouraged to resolve questions or disagreements with any species listed by consulting the original manuscript reporting the species and/or obtaining the specimens or specimens in question for examination. Only those species reported from the estuary from the limit of tidal influence to the mouth of West Pass and East Pass are included in this inventory. Species reported from the nearshore waters and habitats of the Gulf of Mexico and those species considered to be primarily freshwater inhabitants are not included in the lists. A discussion of the criteria for listing species is provided in the Materials and Methods section below.

Biodiversity

This inventory is a biodiversity exercise, in particular, a species diversity inventory. What it is, what it says, and what it does not say should be explained. Stein et al.¹¹⁰ provided an analysis of the species diversity of the United States and provided an explanation of the various subdivisions of the concept of biodiversity. Biodiversity embraces the number of living resources that occupy the planet Earth or a given area of the planet. Once the term was established, it was refined by subdividing it into levels of biodiversity. This could be viewed as complicating the term, but the levels of inquiry appear to be valid and refine the meaning of the term. Within biodiversity is genetic diversity. It refers to the genes present in living things, not just as species but the genetic differences between the members of the same species. Species diversity refers to the number of species that occupy a given area; then group diversity such as the number of species of beetles that occupy a given area; community diversity refers to the number of biotic communities that occupy a given area; and ecosystem diversity refers to the number of ecosystems that occupy a given area. The concept of the species is central to the hierarchy because the species contains the genes, species are organized into populations, populations are organized into biotic communities, and biotic communities are organized into ecosystems (in conjunction with the abiotic or non-living components of an area).

The study of biodiversity becomes an exercise in counting living things, and the result of the counting is an inventory of those living things in a given area. The basis of biodiversity studies is

the science of taxonomy. Taxonomists collect, describe new species, categorize, and catalogue living things, and thereby, provide the species and their distributions for analysis. Biodiversity studies are only as complete as the taxonomy at the level one is working. This manuscript is a species diversity inventory of the species that have been reported to occupy a given area of Bay County, Florida. The area of Bay County inventoried is the St. Andrew Bay estuary. The result of the effort is the number of species that have been reported from the estuary or estuarine influenced habitats.

Biodiversity “Hotspots”

Stein et al.¹¹⁰ identified six areas of high species diversity in the U.S. and referred to them as “hotspots”. These hotspots occur in the southern Appalachian area, Southern California, Death Valley, San Francisco Bay area, Hawaii, and the Florida Panhandle. The hotspot in the Florida Panhandle is centered on the Apalachicola river basin in Florida. The St. Andrew Bay ecosystem and its St. Andrew Bay estuary is at the western edge of this area of high species diversity, and may be more deserving of recognition for its species diversity than has been previously considered.

Importance of Species Diversity Inventories

It is reasonable to ask why the knowledge of the species diversity of a given area is important. The stability of a biotic community or ecosystem to withstand or adapt to alterations in the environment is related to the number of different species present. The greater the number of species present, the greater the adaptability to change in the system. For example, a lawn with only St. Augustine grass has a very low species diversity. Any environmental factor that changes and adversely effects the grass adversely effects the entire area. An insect infestation can destroy the entire lawn easily and quickly. In general, a lawn (if one can call it that) that contains a variety of grasses and even some weeds is more stable, because the decrease in the population of one species, in response to a changing environmental factor, is usually compensated for by an increase in one or more species, and the area remains vegetated. The number of different species that occupy a given area is the beginning point to an understanding of the living things that exist in conjunction with the human residents of the area. A species inventory also provides us a means of comparing one inventoried area with other areas that have been inventoried in a similar manner. It provides the ground work for understanding our environment and is a desirable beginning point for developing a plan to conserve species diversity in an area.

Limitations of Species Diversity Inventories

A species diversity inventory, simply stated as “species known to occur or not known to occur in an area”, does not tell us how abundant each species is, the variety of habitats present, the abundance and distribution of those habitats, the organization of species into living communities, and the extent and distribution of those biotic communities. Such an inventory does not tell us which species are rare or why they are rare, or if species reported previously are still present. Part of the designation of a species diversity hotspot is the number of endemic or rare species that

occur in the area. One thing is certain, there are many unreported species and some species waiting for a taxonomist to describe them in the St. Andrew Bay estuary. Work should continue to describe new species and to inventory known species in our estuary. Once we know what species are present, we should move on to determining where these species are found, how many individuals of each species are present, how they are organized into biotic communities, and the human activities that may affect them.

The Ideal Species Diversity Inventory

Swain et al.¹⁰⁹, in their preliminary species list for the Indian River Lagoon, provided the following statement regarding their efforts. "Ideally this species list should include far more information about species records, for example: authority/dates; locality information and latitude and longitude; depth; collector; vessel; station number; date collected; This would be most useful for management planning by helping us to: identify biodiversity hotspots; pinpoint geographic areas with inadequate sampling; determine critical habitats; and recognize threatened and endangered species." Their concluding statement about their work applies equally to this document for the St. Andrew Bay estuary. "At best, therefore, this should be regarded as a 'Preliminary Species List for the Indian River Lagoon' that can provide the foundation for further information gathering and compilation."

Some of the studies used to develop this inventory provide, along with a list of the species identified and the place where they were collected, a species diversity index analysis, and most all of the information stated as desirable above. It would be desirable to include all elements of the above-described "ideal" inventory, but that is beyond the capabilities of the writer, working alone in terms of time and funding.

Species Diversity and the St. Andrew Bay Estuary

The majority of the residents of Bay County are aware of the importance of the St. Andrew Bay estuary because it is, directly and indirectly, a source of economic benefit to the community. Therefore, the maintenance of the quality of water in the estuary and the species diversity of the estuary is of primary interest. However, concentration on the estuary alone is short sighted, because the St. Andrew Bay estuary is not an entity unto itself. The estuary is a part of the St. Andrew Bay ecosystem and is, therefore, dependent on the happenings within the ecosystem as a whole. All of the surface water and ground water within the St. Andrew Bay ecosystem moves to the St. Andrew Bay estuary and then to the Gulf of Mexico. The net movement of water along the Bay County coast of the Gulf of Mexico is westward along the beaches. Therefore, the quality, quantity, and seasonal distribution of the water entering the estuary from the entire ecosystem affects not only the "health" of the estuary, but the condition of the nearshore waters of the Gulf of Mexico and the beaches of Bay County. The movement of tidal water within the system also affects the health of the estuary, but this tidal movement is not great when compared with other estuaries in the United States. In short, the maintenance of the natural functions of the upland, wetland, and freshwater parts of the St. Andrew Bay ecosystem is crucial to keeping the St. Andrew Bay estuary healthy. Of course, the species diversity of the estuary and the ecosystem

is a result of the interaction of the biotic (living) component of the system with the abiotic (physical and chemical) component of the ecosystem.

Summary

This document is one of those beginning species diversity inventories that provides information as to the number of species reported from the chosen area. It demonstrates where there are gaps in our knowledge of the species present in our estuary and identifies those groups of organisms that have been most collected and identified and those that require additional collection and identification. It also includes a list of the biotic communities in the estuary based on the description of those communities as defined by the Florida Natural Areas Inventory (FNAI). It is hoped that this inventory will aid in obtaining the recognition that the St. Andrew Bay ecosystem and its estuary deserve. Information pertaining to the chemical and physical quality of the water in the estuary and the characteristics of the variety of sediment types in the estuary can be obtained from various organizations and agencies. One can consult Shaffer (1993) or the searchable St. Andrew digital library at <http://aoml.noaa.gov/general/lib/sadl.html>. for this information.

Introduction to the St. Andrew Bay Estuary

The general information pertaining to the St. Andrew Bay estuary is summarized in other documents such as BEST and DEP⁹³, Keppner and Keppner¹⁰³, Brusher and Ogren¹⁰, Ogren and Brusher⁶⁶, and Thorpe et al.¹¹² and is not repeated here. The St. Andrew Bay ecosystem, of which the St. Andrew Bay estuary, is a part is relatively small and the drainage basin that defines the ecosystem is located entirely in the State of Florida and includes all of Bay County and portions of Washington, Gulf, Jackson, and Calhoun Counties. The Lake Powell drainage basin occupies a small area in the southwestern part of Bay County and southeastern part of Walton County. The Lake Powell estuary is not included here as part of the St. Andrew Bay estuary nor are species reported from that estuary included here, although the differences are minor. Those interested in the Lake Powell drainage basin can find some information in Keppner and Keppner¹¹⁷.

Materials and Methods

The criteria for listing species in this inventory follows the criteria used for the species diversity inventory for the Indian River Lagoon, located on the east coast of Florida. The Indian River Lagoon is considered to be an important estuary in the United States and has been included in the National Estuary Program (NEP). This means that a considerable amount of money is being provided to the NEP organization for the Indian River Lagoon under the auspices of the U.S. Environmental Protection Agency. The federal and, presumably, state funds, provided to the Indian River NEP organization are to maintain, restore, and understand the Indian River Lagoon.

Part of the funding under the NEP has been directed at obtaining information regarding the species diversity of the Indian River Lagoon. According to information provided at the website

for the Indian River Lagoon species inventory (www.sms.si.edu), the species listed in that inventory included those which: 1) occur within the Indian River Lagoon during some stage of their life cycles; 2) those which utilize adjacent wetland areas; 3) those bird species which frequent the flyway above the lagoon; and 4) species which occur most often in adjacent upland habitats (scrub, shoreline plants, etc.), but which are also tolerant of estuarine conditions. This inventory attempts to follow the criteria for the species diversity study of the Indian River Lagoon (Swain et al.¹⁰⁹).

This inventory is based on a search of the existing and available literature pertaining to St. Andrew Bay that could be located by the author. Documents reporting additional species from the estuary have, undoubtedly, been missed by the author. The literature searched included articles in scientific journals, consultant's reports to agencies, theses, state and federal agency reports and publications, and specimens in various collections in Bay County. The literature used to develop the inventory is listed alphabetically in the literature cited and by number in the lists. Literature discovered after the printing of the first inventory is placed separately at the end of the "literature cited" section and is alphabetical and numbered consecutively from the last citation included in the first report.

The appended lists of the species include, at minimum, the scientific name of each species arranged alphabetically followed by the reference number or numbers that list that species. Some taxa are arranged by family then genus and species. Other taxa for which the writer has no taxonomic knowledge are listed alphabetically by non-taxonomic groupings or by Phylum. Sources of information other than referenced manuscripts or reports are indicated by an * or a number of *'s and are explained at the beginning or end of the list. Common names, where encountered, are those used by the various authors or were obtained from more or less official lists. The common names of the vascular plants are from Wunderlin¹¹⁴, finfish from the American Fisheries Society Special Publication 20, the molluscs from the American Fisheries Society Special Publication 16, amphibians and reptiles from Ashton and Ashton¹¹⁵, birds from the list provided by Loftin et al.⁵⁶ and the mammals from Brown¹¹⁶.

Results and Discussion

Some conditions were established in determining the number of species from the St. Andrew Bay estuary. Almost every grouping presented its own concerns, and the decision as to how the species were counted is discussed for each grouping. Those determinations listed as spp. means that more than one species of that taxon was encountered by the particular author. However, it was not possible to determine the number of species involved. Therefore, spp. was counted as one species in all groups, if counted at all. Of course, errors will result and duplications may be made using this method. However, it is also likely than some species will be omitted by the same method.

The Natural Biotic Community Diversity of the St. Andrew Bay Estuary

The Florida Natural Areas Inventory (FNAI)⁹⁷ provides a definition for each of the 70 natural

biotic communities that they identify in Florida and provides a ranking with regard to the rareness of each community type. These living communities, as defined by FNAI, that are present in or influenced by the St. Andrew Bay estuary are provided in Table 1. Table 1 also includes the ranking provided by FNAI⁹⁷. The ranking numbers are from FNAI⁹⁷: S2 = imperiled in Florida because of rarity or vulnerability to extinction due to some natural or human factor; S3 = Either very rare or local throughout range in Florida, or found locally in a restricted range in Florida, or vulnerable to extinction from other factors; S4 = Apparently secure in Florida; S5 = demonstrably secure.

There are a few acres of black mangroves that have persisted for at least 10 years on the north side of Shell Island. The plants are small (last observation about 2.5 feet tall) and very dense. This small area was not considered to be representative of a tidal swamp community as defined by FNAI. Nevertheless, it is present and persistent, although not included in the table.

Table 1 contains 12 estuarine/marine and estuarine influenced biotic communities. The St. Andrew Bay estuary also has large rock jetties at West Pass. West Pass is a man-made pass into the estuary that provides access to the federally maintained navigation channel to the Port of Panama City and the Gulf Intracoastal Waterway. The jetties support a diverse flora and fauna associated with hard surfaces. Another rock jetty exists in the estuary at the end of Frankfurt Avenue and also supports a diverse flora and fauna. Both areas are used extensively by snorkelers and SCUBA divers. Although, these are man-made structures, they have contributed to the species diversity of the estuary. Because of their human origin, these jetties are not included in Table 1.

Table 1. Natural Estuarine and Estuarine-Influenced Biotic Communities of the St. Andrew Bay Estuary (from FNAI⁹⁷)

Category	Community	Description
Marine/Estuarine		
	Unconsolidated Substrate	Expansive subtidal, intertidal, and supratidal area composed primarily of loose mineral matter (e.g. mud, sand, shell). Rank = S5 (secure)
	Grass Bed	Expansive subtidal or intertidal area, occupied primarily by rooted vascular macrophytes (e.g. shoal grass, <i>Halophila</i> , widgeon grass, manatee grass, turtle grass; may include various epiphytes and epifauna. Rank = S2 (imperiled)
	Algal Bed	Expansive subtidal, intertidal, or supratidal area, occupied primarily by attached thallophytic or mat-forming prokaryotic algae (e.g. halimeda, blue-green algae). Rank = S2 (imperiled)
	Tidal Marsh	Expansive intertidal or supratidal area occupied by rooted, emergent vascular macrophytes (e.g. cord grass, needlerush, saw grass, saltwort, saltgrass, & glasswort. Rank = S4 (apparently secure)

	Mollusk Reef	Substantial subtidal or intertidal area with relief from concentrations of sessile organisms of the Phylum Mollusca, Class Bivalvia (e.g. molluscs, oysters, & worm shells). Rank = S3 (vulnerable)
Terrestrial	<i>Xeric Uplands</i>	
	Scrub	Scrub is found on old dunes with deep, fine sand substrate; temperate or subtropical; occasional or rare fire (20-80 years); sand pine and/or scrub oaks and/or rosemary and lichens. Rank = S2 (imperiled)
	<i>Coastal Uplands</i>	
	Maritime Hammock	Stabilized coastal dune with sand substrate; xeric-mesic; subtropical or temperate; rare or no fire; mixed hardwoods and/or live oak. Rank = S2 (imperiled)
	Coastal Strand	Stabilized coastal dune with sand substrate; xeric-mesic; subtropical or temperate; occasional or rare fire; dense saw palmetto and/or seagrape and/or mixed stunted shrubs, yucca and cacti. Rank = S2 (imperiled)
	Coastal Grassland	Coastal flatland with sand substrate; xeric-mesic; subtropical or temperate; occasional fire; grasses, herbs, and shrubs with or without slash pine and/or cabbage palm. Rank = S2 (imperiled)
	Shell Mound	Indian midden with shell substrate; xeric-mesic; subtropical or temperate; rare or no fire; mixed hardwoods. Rank = S2 (imperiled)
	<i>Mesic Flatlands</i>	
	Mesic Flatwoods	Flatland with sand substrate; mesic-xeric; subtropical or temperate; frequent fire; slash pine and/or longleaf pine with saw palmetto, gallberry and/or wiregrass or cutthroat grass understory. Rank = S4 (apparently secure)
Palustrine	<i>Wet Flatlands</i>	
	Wet Flatwoods	Flatland with sand substrate; seasonally inundated; subtropical or temperate; annual or frequent fire; slash pine or pond pine and/or cabbage palm mixed with grasses and herbs. Rank = S4 (Apparently secure)

Phytoplankton, Periphyton, and Macroalgae

The periphyton and phytoplankton are generally microscopic, single-celled or microscopic colonial organisms. The phytoplankton community occurs in the water column while the

periphyton community occurs on seagrass leaves and other objects. The species listed as phytoplankton and as periphyton overlapped to a degree in that the same species were reported from each group. If a species was included in both groupings, it was counted only once as a species in the total count of microalgae. Based on this method of counting, there is a total of 278 different species in 132 different genera of microscopic algae in reported from St. Andrew Bay. The periphyton contained 169 species in 78 genera, and the phytoplankton contained 130 different species in 76 different genera including those in common with the periphyton. The macroalgae are large visible species of algae that are generally attached to the substrate. There are 28 species of macroalgae in 24 genera on the list. These groups of organisms should be investigated much more thoroughly.

Lichens and Fungi

There are many species of lichens and fungi associated with the coastal habitats that have not, to the author's knowledge, been reported from the St. Andrew Bay ecosystem. The British Soldier Moss (*Cladonia leporina*), a lichen, is very abundant in the coastal scrub habitat and in the sandhills of the ecosystem. Lichens are mutually beneficial (symbiotic) associations of some species of fungi and algae. This inventory contains only the one genus and species. Fungi, particularly the mushrooms etc., are appear to be quite abundant in the ecosystem, and the species and distribution should be studied more intensively. This inventory contains eight species in eight genera that are found in the coastal scrub habitat.

Vascular Plants

The Indian River Lagoon criterion for listing the species of vascular plants was difficult to interpret and apply to the St. Andrew Bay estuary. The criterion states that species are listed that occur most often in adjacent upland habitats (scrub, shoreline plants, etc.), but which are also tolerant of estuarine conditions. The St. Andrew Bay estuarine system has pine islands that are surrounded by saltmarsh such as those at the Goose Bayou marsh area of North Bay and narrow peninsulas such as the Lathrop Tract in East Bay. These areas are tolerant of estuarine conditions and are usually affected greatly by storms and hurricanes. These areas are either scrub with its sand pine, sand live oaks, and rosemarys or slash pine, wet, coastal flatwoods. There are also a few maritime hammocks and a number of shell mound communities associated with the estuary. Lastly, there are large areas around the bay system where the shoreline is eroding into the coastal pine flatwoods in these areas.

Which species to list was difficult to determine and is arbitrary in some instances. In order to make the Indian River Lagoon inventory and this inventory as comparable as possible regarding the vascular plants, the Indian River Lagoon list was examined and those species on the list that are also known from Bay County were included in this inventory. The list of vascular plants known from Bay County (Keppner and Keppner¹⁰⁴) was consulted for additional species associated with the St. Andrew Bay estuary. However, all of the species listed from the St. Andrew State Park were not included because the park contains a variety of communities including freshwater ponds and marshes. The same is true for the species listed for the Lathrop

Tract. This area includes a number of species associated with the wet, coastal flatwood community even though this area was over-washed by the storm surge from Hurricane Opal. Swain et al.¹⁰⁹ listed a few genera as spp. such as *Utricularia* spp. and *Rhynchospora* spp. The same was done here to maintain some conformity between the two inventories.

The result of this exercise is a list of vascular plants that contains 149 species in 117 genera in 52 families. The report of the black mangrove remains accurate, because the stands of this plant on Shell Island continue to be observed by those who recognize the species. A number of state and federally protected plant species are associated with the St. Andrew Bay estuarine marshes and coastal area. Keppner and Keppner¹⁰⁴ provided a list of these species for Bay County, Florida.

Animals

There are many taxa of animals that are not present on the list that undoubtedly occur in the St. Andrew Bay estuary. Foremost, is the absence of the parasitic forms such as the parasitic Nematoda, parasitic Platyhelminthes (flukes and tapeworms), and the entirely parasitic Acanthocephala. The number of species of the internal and external parasites of the animals in the estuary would be quite extensive, because almost every species of multicellular organism, if not all, support populations of ectoparasites and endoparasites. The number of species of arthropods associated with the estuary itself and included in this inventory is extensive, although other species await description or collection. Arthropods associated with the terrestrial, estuarine-influenced communities may exceed those present within the estuary. Suffice it to say that only the surface of the species diversity of the St. Andrew Bay estuary has been scratched. Underneath lies an abundance of species.

Protozoa

Protozoa are microscopic, single-celled or colonial organisms found in freshwater and marine habitats and other moist areas. The St. Andrew Bay estuary is known to support a total of 109 species of protozoans in 56 genera. There are 28 species in 10 genera reported as zooplankters and 81 species and subspecies in 46 genera reported from benthic habitats. Many more await collection and identification.

Porifera

There have been 15 species in 13 genera reported from the St. Andrew Bay estuary. Undoubtedly, there are other genera and species living in the system.

Coelenterata

The Coelenterata (Cnidaria) include the jellyfish, sea anemones and other organisms with stinging cells. They are both sessile and pelagic and some are included in the zooplankton in some of the literature cited herein. A total of 51 species in 47 genera of the phylum Coelenterata have been reported from the St. Andrew Bay estuary. Of this total 24 species in 20 genera were reported as

part of the zooplankton and 22 species in 22 genera were reported from benthic habitats.

Ctenophora

Ctenophores, or comb-jellies, are small jelly-fish like creatures that can become very abundant in the estuary. They are considered to be part of the zooplankton in the studies cited in this inventory. Three species in three genera have been reported from the St. Andrew Bay estuary.

Platyhelminthes

The platyhelminths, or flatworms, have both free-living and parasitic species. The free-living species are generally associated with the sediments in estuaries. The parasitic species are external and internal parasites of many species of animals and can have very complex life cycles. Only 5 species in 4 genera of the Phylum Platyhelminthes have been reported from the St. Andrew Bay estuary to the author's knowledge. This a fraction of the total number of species that potentially exist in the sediments or are external or internal parasites in the estuary.

Rotifera

Rotifers, or wheel organisms, are multicellular, microscopic animals that live in freshwater and marine water. Only two species in two genera have been reported from the zooplankton of the St. Andrew Bay estuary. Others are probably associated with the various substrates in the estuary.

Gastrotricha

Gastrotrichs are also multicellular, microscopic animals that live in freshwater and estuarine and marine sand. A single species in a single genus is known from the St. Andrew Bay estuary, and other species are probably present.

Kinorhyncha

Kinorhynchs are small worm-like animals that have a body that is divided into 13-14 zones or segments. They live in the substrate of estuarine and marine environments. A single species in a single genus has been reported from the St. Andrew Bay estuary.

Nematomorpha

Only one species in one genus of the Phylum Nematomorpha has been reported from the St. Andrew Bay estuary. The author is aware of only a single genera of Nematomorpha that parasitizes salt water organisms, the genus *Nectonemua*. However, there may have been many more since the author's last thought about these interesting animals.

Nematoda

Nematodes, or roundworms, occupy almost every habitat on Earth and many consider them to be the most abundant organisms on the planet, not in terms of number of species but numbers of individuals. There are 278 species of the phylum Nematoda in 140 genera reported from the St. Andrew Bay estuary. Many additional unidentified species are present in the author's collection, and many additional species await collection and identification. Included here are only those species of marine nematodes reported from the estuary. There are numerous species of parasitic nematodes that parasitize all of the estuarine vertebrates or those associated with the estuary.

Nemertinea (Rhynchocoela)

Nemertine worms live among rocks, algae, or in tubes in the sediments of estuarine and marine environments. There is a small number of species that live in freshwater or moist tropical habitats. Seven species in seven genera have been reported from the St. Andrew Bay estuary.

Chaetognatha

The chaetognaths or arrow worms are small, predatory, zooplanktonic organisms. Six species in three genera have been reported from the St. Andrew Bay estuary.

Phoronida

The Phoronida are worm-like animals that attach to pilings, build tubes in sediment, or burrow among rocks and shells. A single species in a single genus has been reported from the St. Andrew Bay estuary.

Ectoprocta (Bryozoa)

The ectoprocts are colonial animals that occur in freshwater and marine habitats where they secrete a covering for themselves. The colonies form gelatinous or encrusting masses on the substrate and are sometimes called moss animals. Nine species of ectoprocts in 8 genera have been reported from the St. Andrew Bay estuary.

Brachiopoda

Brachiopods are slow moving or sessile animals with a clam-like shell. They are entirely marine and they were abundant at the beginning of the Cambrian era about 600,000,000 years ago. A single species in a single genus has been reported from the St. Andrew Bay eastuary.

Mollusca

The mollusks are very abundant animals in both marine and freshwater habitats. They include clams, mussels, chitons, squids, octopi, sea hares, etc. A few are associated with the open water,

but most are associated with bottom sediments and reefs. However, three species in three genera were reported from the zooplankton. The list contains a number of citations designated as family, and these were not counted. Also, those designated as species or spp. were counted if there was only one in a genus, or if they were from the same author. Those designated as sp. by one author in a genus with other named species were not counted. Based on this method of counting, there are 343 species and subspecies of phylum Mollusca in 191 genera reported from the St. Andrew Bay estuary.

Annelida

Annelid worms are segmented organisms that live primarily in the sediments of the estuary. However, there has been one species in one genus reported as a member of the zooplankton. In total there are 378 species of annelids in 205 genera reported from the St. Andrew Bay estuary. The species of annelids were counted in the same way that the mollusks were counted.

Sipunculida

Sipunculid worms are sedentary animals that burrow in sediments, live among rocks, or in coral reefs. Four species in four genera have been reported from the St. Andrew Bay estuary.

Arthropoda

The arthropods are the most numerous of all species of animals on Earth and occupy almost all habitats, terrestrial or aquatic. They all have jointed appendages. Those listed here include mostly aquatic species, but a few terrestrial or marsh related species have been included. There are 593 species in 323 genera reported from St. Andrew Bay on both the zooplankton and benthic faunas. Foster and Heard⁹⁸ are currently gathering a complete taxonomic list of the crustaceans (crabs, shrimps, amphipods, etc.) reported from the St. Andrew Bay estuary. They generously provided a copy of their work to date. Their list, in its current form, added many species of crustaceans to the list and brought more sense to the counting of the species.

Echinodermata

The echinoderms, or tube-feet animals, include starfish, sea cucumbers, sand dollars, sea urchins, brittle stars, and other species. Echinoderms are exclusively marine organisms and are found at all depths of the sea and in most oceans of the planet. Twenty eight species in 23 genera have been reported from the St. Andrew Bay estuary.

Hemichordata

The hemichordates, or acorn worms, are worm-like animals that primarily live in tubes in estuarine and marine sediments. A single species in a single genus has been reported from the St. Andrew Bay estuary.

Urochordata (Phylum Chordata)

These are the tunicates or sea squirts. A few species are pelagic, but most are sessile, solitary or colonial animals that attach to various substrates in the estuarine/marine environment. Twelve species in six genera of pelagic tunicates, and seven species in seven genera of sessile tunicates for a total of 19 species in 12 genera have been reported from the St. Andrew Bay estuary.

Vertebrata (Phylum Chordata)

The vertebrates are the fish, amphibia, birds, and mammals with which we are all familiar. The St. Andrew Bay estuary supports 309 species of finfish in 184 genera. The number of species of amphibia associated with the terrestrial and freshwater habitats of the coastal zone could be expanded. Rather than making arbitrary decisions as to which species to add, the list from the Swain et al.¹⁰⁹ was used as a guide. Four species in three genera of amphibians are included in the list. The same method was followed in listing the reptiles, and there are 14 species in 14 genera in the list. The bird (Aves) list also followed that of Swain et al.¹⁰⁹. St. Andrews State Recreation Area is a peninsula with the Gulf of Mexico on the south and the estuary to the north, and part of the Recreation Area is located on Shell Island, a barrier island. The majority of the birds listed here have been reported from the Recreation Area. The list of birds contains 225 species in 125 genera. The list of mammals associated with the estuary or estuarine influenced habitats contains 35 species and subspecies in 30 genera.

Table 2 is a summary of the number of species of organisms in each group that have been reported from the St. Andrew Bay estuary, reported from the United States from Stein et al.¹¹⁰, and reported from the Indian River Lagoon from Swain et al.¹⁰⁹.

Table 2. Number of Species Reported from the St. Andrew Bay Estuary, U.S. and the Indian River Lagoon

Group	Species from St. Andrew Bay	Species from U.S.*	Species from Indian River Lagoon
Microalgae	278	?	250
Macroalgae	28	?	142
Fungi	8	34,000	0
Lichens	1	3,800	0
Vascular Plants	149	15,869	147
Protozoa	109	?	175
Porifera	15	375	14
Coelenterata	47	1620	31
Ctenophora	3	45	2
Platyhelminthes	5	6000	5

Rotifera	2	700	0
Gastrotricha	1	100	0
Kinorhyncha	1	20	3
Priapulida	0	3	0
Nematomorpha	1	3	0
Nematoda	278	5300	0
Nemertinea	9	253	1
Entoprocta	0	28	37
Tartigrada	0	200	2
Chaetognatha	6	25	6
Phoronida	2	9	4
Ectoprocta	9	934	36
Brachiopoda	1	10	1
Mollusca	340	7500	428
Annelida	378	3360	145
Sipunculida	4	45	18
Echiura	0	30	1
Arthropoda	593	115638	360
Echinodermata	28	1110	31
Hemichordata	1	26	1
Urochordata	19	285	31
Pisces	309	saltwater = ?	398
Amphibia	4	231	4
Reptilia	14	283	20
Aves	225	768	202
Mammalia	35	416	34
TOTAL SPECIES	2913		2529
*from Stein et al. ¹¹⁰			

Protected Species

A number of species of plants and animals associated with the estuary are protected by Florida law and by the federal Endangered Species Act. Many of the birds are protected as are the sea turtles, dolphin, manatee, beach mice, and a number of vascular plants. Information regarding the protected species can be obtained from FNAl⁹⁷, Keppner and Keppner¹⁰³, and Keppner¹⁰⁴. In addition, information regarding federally protected species can be obtained from the U.S. Fish and Wildlife Service Field Office in Panama City, Florida and the National Marine Fisheries Service Laboratory in Panama City Beach, Florida. Information regarding state protected species can be obtained from the Florida Fish and Wildlife Conservation Commission Office in Panama City and the Department of Environmental Protection Office in Panama City.

The St. Andrew Bay Estuary and the Indian River Lagoon, a Comparison

To the writer's knowledge, the Indian River Lagoon is the only estuary in Florida that has a published species diversity inventory with which the St. Andrew Bay estuary can be compared. The Indian River Lagoon species inventory has a website, www.sms.si.edu/irlspec/Proj_Bkgnd.htm. According to the information at the website, the Smithsonian Marine Station at Fort Pierce, Florida has become the depository for the inventory. It is stated at the website that having no documentation of the high biodiversity of the Indian River Lagoon hampered scientific understanding of this complex system, and was also seen as a major drawback to developing a comprehensive management strategy to protect biodiversity in the Indian river Lagoon. The work of Swain et al.¹⁰⁹ forms the basis for the Indian River Lagoon species inventory and provided the first substantial evidence which attested to the high species richness of the Indian river Lagoon system.

The stated goal of the Smithsonian Marine Station with regard to the species diversity inventory is to continue to promote public awareness and the need for stewardship of the Indian River Lagoon as a valuable marine resource. During their first year, they expanded species reports and laid the foundation for the Indian River Lagoon species inventory project to be increasingly used as an educational and management tool. It is hoped that the species inventory for the St. Andrew Bay system will be used in a similar manner. Table 3 provides a comparison of the Indian River Lagoon and the St. Andrew Bay system.

Table 3. Comparison of the Indian River Lagoon and the St. Andrew Bay Estuary

	Indian River Lagoon	St. Andrew Bay
Biotic Provinces	Subtropical & Temperate (155 miles long)	Temperate
Surface Area	353 sq. miles	107 sq. miles
Watershed Area	2,284 sq. miles	1107 sq. miles
Number of Plant Species	539	464

Number of Invertebrate Species	1332	1852
Number of Vertebrate Species	658	587
Total Number of Species	2529	2913
Species/sq. mile Surface Area	7.16	27.2

The total number of species reported from the St. Andrew Bay estuary exceeds the total number of species for the Indian River Lagoon by only 385 species. However, if one considers the size of the two estuaries, the Indian River Lagoon supports 7.16 species per square mile of surface water whereas the St. Andrew Bay estuary supports 27.2 species per square mile of surface water.

Summary

In summary, the St. Andrew Bay estuary is a small estuary as compared to other estuaries, and it is a part of a small St. Andrew Bay ecosystem as compared to other ecosystems. The St. Andrew Bay estuary has a significant community and species diversity as compared to the recognized species diversity of the Indian River Lagoon. The maintenance of the community and species diversity of the estuary is dependent on the maintenance of a functional St. Andrew Bay ecosystem and protection and conservation of the estuary itself. The ecosystem provides the freshwater inflow to the estuary that significantly influences the characteristics of the estuary. Maintenance of the quantity, quality, and seasonal distribution of freshwater to the estuary is essential to maintaining the estuary. Alteration of the estuarine shorelines, marshes, islands, and associated terrestrial communities has an impact upon the estuary. Stormwater runoff from developed areas adjacent to the estuary has been identified as a major concern in preserving the character of the estuary.

As the St. Andrew Bay ecosystem is developed for human use, possibilities exist that community and species diversity will decline within the estuary and ecosystem. A continuous monitoring program to assess the status and trends of the community and species diversity of the St. Andrew Bay estuary would be one method of tracking the impacts of that development.

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APPENDIX 1.

Phytoplankton Reported from the St. Andrew Bay Estuary

Filamentous Blue-green Algae Reference Number

<i>Anabaena fertillisima</i>	75
<i>Microspora</i> sp.	75, 77
<i>Oscillatoria erythraea</i>	75

Coccoid Green Algae

<i>Chlorella</i> sp.	74
<i>Merisnopenia</i> sp.	74
<i>Nanochloris</i> sp.	

Filamentous Green Algae

<i>Spirogonium</i> sp.	75
<i>Spirogyra</i> sp.	75, 88
Undeterm. sp.	75

Green Flagellates

<i>Chlamydomonas</i> sp.	75
<i>Eudorina</i> sp.	74
<i>Euglena</i> sp. A	75
<i>Euglena</i> sp. B	75
<i>Gonium sociale</i>	75
<i>Nanoplankton</i> sp.	75
<i>Pandorina</i> sp.	74

Other Flagellates

<i>Amphidinium carteri</i>	75
<i>Amphesolenia bifurcata</i>	75
<i>Amphisolenia bidentata</i>	75
<i>Amphisolenia</i> sp.	75
<i>Blepharocysta splendo-maris</i>	75
<i>Blepharocysta</i> sp.	75
<i>Cachonina niei</i>	74
<i>Cachonina</i> sp.	77
<i>Ceratium furca</i>	75, 78
<i>Ceratium fusus</i>	50, 75, 78
<i>Ceratium trichoceros</i>	75, 78
<i>Ceratium tripos</i> var. <i>atlanticum</i>	78
<i>Ceratium vultur</i> var. <i>sumatranum</i>	75
<i>Ceratium</i> sp.	74, 75
<i>Chaetoceros socialis</i>	74
<i>Chaetoceros</i> sp.	74
<i>Cochlodinium</i> sp.	75
<i>Dinophysis caudata</i>	78
<i>Disodinium lunula</i>	75
<i>Fragilidium</i> sp.	75
<i>Glenodinium</i> sp.	75
<i>Gonyaulax digitalis</i>	75
<i>Gonyaulax monilata</i>	75
<i>Gonyaulax</i> sp.	75
<i>Gymnodinium breve</i>	75
<i>Gymnodinium coeruleum</i>	75

Phytoplankton Reported from the St. Andrew Bay Estuary

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<i>Gymnodinium splendens</i>	74, 75
<i>Gymnodinium</i> sp.	75
<i>Gyrodinium glaucum</i>	75
<i>Heteraulacus sphericus</i>	75
<i>Noctiluca scintellans</i>	30
<i>Ornithocerus</i> sp.	75
<i>Oxytoxum elegans</i>	75
<i>Oxytoxum gigas</i>	75
<i>Oxytoxum</i> sp.	75
<i>Peridiniopsis asymmetrica</i>	74
<i>Peridinium elegans</i>	75
<i>Peridinium depressum</i>	78
<i>Peridinium leonis</i>	75
<i>Peridinium nipponicum</i>	75
<i>Peridinium oblongum</i>	75
<i>Peridinium</i> sp. A	75
<i>Peridinium</i> sp. B	85
<i>Peridinium</i> sp.	74, 75
<i>Phalacroma hindmarchi</i>	75
<i>Phalacroma rotunda</i>	75
<i>Phalacroma</i> sp.	75
<i>Podolampas elegans</i>	75
<i>Podolampas spinifera</i>	75
<i>Podolampas</i> sp.	75
<i>Porocentrum compressum</i>	74, 75
<i>Porocentrum gracile</i>	75
<i>Porocentrum micans</i>	74, 75
<i>Porocentrum rostratum</i>	75
<i>Porocentrum</i> sp.	77
<i>Protoperidinium</i> sp.	74, 75
<i>Pyrocystis noctiluca</i>	75
<i>Pyrocystis</i> sp.	75
<i>Pyrophacus</i> sp.	75
<i>Scrippsiella trochoidea</i>	74
Undetermin. sp.	74
Dinoflagellate cyst	75

Centric Diatoms

<i>Aulacodiscus argus</i>	74, 75
<i>Auliscus</i> sp.	78
<i>Coscinodiscus centralis</i>	74, 75
<i>Coscinodiscus radiatus</i>	74, 75
<i>Coscinodiscus</i> sp.	50, 74, 75
<i>Cyclotella</i> sp.	75
<i>Ditylum brightwelli</i>	75
<i>Eupodiscus radiatus</i>	75
<i>Odontella alternans</i>	75
<i>Odontella chinensis</i>	75
<i>Odontella mobiliensis</i>	75
<i>Podosira stelliger</i>	75
<i>Raphoneis surirella</i>	75

<i>Skeletonema costatum</i>	78
<i>Skeletonema</i> sp.	50, 74
<i>Striatella unipunctata</i>	74, 75
<i>Thalassiosira costatum</i>	75
<i>Thalassiosira</i> sp.	75
<i>Triceratium favus</i>	74, 75
<i>Triceratium</i> sp.	78
Pennate Diatoms	
<i>Asterionella glacialis</i>	75
<i>Asterionella japonica</i>	75
<i>Asterionella notata</i>	75
<i>Asterionella</i> sp.	50, 77
<i>Bacillaria paxillifer</i>	75
<i>Bacteriastrum delicatulum</i>	78
<i>Bacteriastrum</i> sp.	75
<i>Bellerochea horologalis</i>	75
<i>Biddulphia mobiliensis</i>	78
<i>Biddulphia sinensis</i>	78
<i>Chaetocerca curvisetum</i>	75
<i>Chaetocerca gracilis</i>	75
<i>Chaetocerca lorenzianus</i>	75
<i>Chaetocerca socialis</i>	75
<i>Chaetocerca</i> sp.	50, 78
<i>Coccconeis</i> sp.	75
<i>Cymatosira belgica</i>	75
<i>Diploneis</i> sp.	75
<i>Fragilaria oceanica</i>	75
<i>Fragilaria</i> spp.	50
<i>Grammatophora marina</i>	75, 78
<i>Gyrosigma spenceri</i>	74
<i>Gyrosigma</i> sp.	75
<i>Hemiaulus membranaceus</i>	78
<i>Hemiaulus sinensis</i>	78
<i>Mastogloia</i> sp.	75
<i>Navicula clavata</i>	75
<i>Navicula lyra</i>	75
<i>Navicula wawrikiae</i>	75
<i>Navicula</i> sp.	75
<i>Navicula</i> spp.	50, 74
<i>Nitzchia pungens</i> var. <i>atlanticum</i>	75
<i>Nitzchia closterium</i>	75
<i>Nitzchia</i> sp.	50, 74, 75, 78
<i>Pinnularia ambigua</i>	75
<i>Pleurosigma baltica</i>	74, 75
<i>Pleurosigma</i> sp.	75
<i>Rhabdonema adriaticum</i>	75
<i>Rhabdonema</i> sp.	50, 75
<i>Rhizosolenia berconii</i>	78
<i>Rhizosolenia calcar-avis</i>	75, 78
<i>Rhizosolenia robusta</i>	75

Phytoplankton Reported from the St. Andrew Bay Estuary

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<i>Rhizosolenia seticera</i>	75
<i>Rhizosolenia stolterrochii</i>	78
<i>Rhizosolenia styliformis</i>	78
<i>Rhizosolenia</i> sp.	50, 75, 78
<i>Striatella interrupta</i>	78
<i>Striatella unipunctata</i>	75
<i>Striatella</i> sp.	78
<i>Thalassionema nitzschiooides</i>	78
<i>Thalassiosira</i> sp.	74
<i>Thalassiothrix frauendorfii</i>	75
<i>Thalassiothrix</i> sp.	74

Appendix 2.

Periphyton and Macroalgae Reported from the St. Andrew Bay Estuary

Filamentous Blue-green Algae Reference

<i>Anabaena fertilissima</i>	75, 76
<i>Calothrix crustacea</i>	75, 76
<i>Calothrix parieteana</i>	105
<i>Calothrix</i> spp.	105
<i>Microchaete</i> spp.	105
<i>Oscillatoria submembranacea</i>	76
<i>Schizothrix</i> sp.	76, 105
<i>Stigonema aerugineum</i>	75

Coccoid Blue-green Algae

<i>Acmenellum</i> sp.	76
<i>Anacystis aeruginosa</i>	76
<i>Anacystis dimidata</i>	75
<i>Anacystis</i> sp.	76

Filamentous Green Algae

<i>Spirogyra</i> spp.	76
<i>Spirogonium</i> sp.	76
Undetermn. sp.	76

Coccoid Green Algae

<i>Chlorella</i> sp.	75, 76
<i>Gonium sociale</i>	76
Undetermn. sp.	76

Green Flagellates

<i>Amphosolenia bifur.</i>	
<i>Amphosolenia</i> spp.	76
<i>Blepharocysta splendo-maris</i>	76
<i>Ceratium furca</i>	76
<i>Ceratium fuscus</i>	76
<i>Ceratium hircus</i>	76
<i>Ceratium trichoceros</i>	76
<i>Ceratium</i> spp.	76
<i>Cochlodinium</i> sp.	76
<i>Dinophysis caudata</i>	76
<i>Dinophysis ovum</i>	76
<i>Dissodinium lunula</i>	76
<i>Fragilidium</i> spp.	76
<i>Glenodinium</i> spp.	76
<i>Gonyaulax digitalis</i>	76
<i>Gonyaulax monilata</i>	76
<i>Gonyaulax</i> spp.	76
<i>Gymnodinium breve</i>	76
<i>Gymnodinium coeruleum</i>	76
<i>Gymnodinium lunata</i>	75
<i>Gymnodinium splendens</i>	76
<i>Gymnodinium</i> spp.	76
<i>Gyrodinium</i> spp.	76
<i>Ornithocercos</i> spp.	76

<i>Oxytoxum gigas</i>	76
<i>Peridinium elegans</i>	76
<i>Peridinium leonis</i>	76
<i>Peridinium oblongum</i>	76
<i>Peridinium</i> spp.	76
<i>Podolampas elegans</i>	76
<i>Podolampas spinifera</i>	76
<i>Porocentrum compressum</i>	76
<i>Porocentrum gracile</i>	75, 76
<i>Porocentrum maximum</i>	76
<i>Porocentrum micans</i>	76
<i>Porocentrum rostrum</i>	76
<i>Porocentrum</i> spp.	105
<i>Protoperidinium</i> spp.	76
<i>Pyrocystis fusiformis</i>	76
<i>Pyrocystis hamulus</i>	76
<i>Pyrocystis lanceolata</i>	76
<i>Pyrocystis noctiluca</i>	76
<i>Pyrophacus steinii</i>	76
<i>Pyrophacus</i> spp.	76
Undetermn. spp.	76

Centric Diatoms

<i>Actinptychus splendens</i>	75
<i>Actinptychus undulatus</i>	75
<i>Actinocyclus</i> spp.	105
<i>Actinptychus</i> spp.	74
<i>Aulacodiscus argus</i>	74, 75, 76
<i>Aulacodiscus</i> sp.	76
<i>Bacteriadrum</i> spp.	74, 75, 76
<i>Bellerochea horogicalis</i>	74, 75, 76
<i>Bellerochea</i> sp.	76
<i>Biddulphia alternans</i>	76
<i>Chaetoceros curvisetus</i>	76
<i>Chaetocercos gracilis</i>	76
<i>Chaetoceros lorenzianum</i>	75, 76
<i>Chaetoceros sociale</i>	76
<i>Chaetoceros</i> sp.	75
<i>Coscinodiscus centralis</i>	74, 75, 76
<i>Coscinodiscus granii</i>	76
<i>Coscinodiscus radiatus</i>	74, 75, 76
<i>Coscinodiscus</i> spp.	74, 75, 76
<i>Cyclotella</i> sp.	74, 75, 76
<i>Eupodiscus radiatus</i>	75, 76
<i>Grammatophora marina</i>	105
<i>Guinardia flaccida</i>	74
<i>Guinardia</i> sp.	76
<i>Isthmia eneryis</i>	75, 76
<i>Isthmia</i> sp.	74
<i>Licmophora remulus</i>	105
<i>Licmophora</i> sp.	105

<i>Melosira mummuloides</i>	105
<i>Melosira</i> sp.	75
<i>Palmeriana hardmanianus</i>	74, 75, 76
<i>Paralia sulcata</i>	75, 105
<i>Raphoneis surirella</i>	74, 76
<i>Skeletonema costatum</i>	76
<i>Skeletonema</i> sp.	74, 75, 76
<i>Thalassiosira</i> sp.	76
<i>Triceratium favus</i>	74, 76
<i>Triceratium</i> sp.	76
Undetermn. sp. A.	76
Undetermn. sp. B	76
Undetermn.	105

Pennate Diatoms

<i>Amphiprora</i> spp.	74, 76
<i>Amphora marina</i>	74
<i>Amphora obtusa</i>	74
<i>Amphora spectabilis</i>	74
<i>Amphora</i> sp.	
<i>Asterionella glacialis</i>	
<i>Asterionella japonica</i>	
<i>Asterionella notata</i>	74,
<i>Asterionella</i> sp.	75, 76
<i>Bacillaria paxillifer</i>	74, 75, 76
<i>Biddulphia alternans</i>	74
<i>Biddulphia</i> sp.	50, 78
<i>Chaetoceros socialis</i>	74
<i>Chaetoceros</i> spp.	74
<i>Cocconeis scutellum</i>	105
<i>Cocconeis</i> sp.	74, 75, 76
<i>Cymatospira belgica</i>	74, 75, 76
<i>Diploneis crabro</i>	75, 76
<i>Diploneis fusca</i>	74
<i>Diploneis smithii</i>	75, 76
<i>Fragillaria islandia</i>	76
<i>Fragillaria oceanica</i>	76
<i>Fragillaria</i> sp.	74
<i>Grammatophora marina</i>	74, 75, 76
<i>Gyrosigma</i> spp.	74
<i>Hyalosynedra laevigata</i>	105
<i>Mastogloia affirmata</i>	105
<i>Mastogloia cf. cribrosa</i>	105
<i>Mastogloia binotata</i>	105
<i>Mastogloia cocconeiformis</i>	105
<i>Mastogloia cribrosa</i>	105
<i>Mastogloia erythraea</i>	105
<i>Mastogloia splendida</i>	105
<i>Mastogloia</i> spp.	74, 75, 76, 105
<i>Navicula cancellata</i>	74, 75, 76
<i>Navicula carnifera</i>	76

<i>Navicula clavata</i>	74, 75, 7766
<i>Navicula longa</i>	76
<i>Navicula lyra</i>	74, 75, 76
<i>Navicula quarnerensisoides</i>	74, 75, 76
<i>Navicula wawrikiae</i>	74, 75, 76
<i>Navicula</i> spp.	74, 75, 76, 105
<i>Neosynedra provincialis</i>	koe
<i>Nitzchia angularis</i>	74, 75, 76
<i>Nitzchia closterium</i>	74, 75, 76
<i>Nitzchia constricta</i>	75, 76
<i>Nitzchia longissima</i>	74, 75, 76, 105
<i>Nitzchia panduriformis</i>	76
<i>Nitzchia punctata</i>	105
<i>Nitzchia pungens</i> var. <i>atlanticum</i>	74, 75, 76
<i>Nitzchia</i> spp.	74, 75, 76, 105
<i>Odontella chinensis</i>	74, 76
<i>Odontella mobiliensis</i>	74, 76
<i>Odontella rhombus</i>	74
<i>Odontella rhombus</i> var. <i>trogona</i>	74
<i>Odontella</i> spp.	77
<i>Palmeriana hardmanianus</i>	74
<i>Paralia sulcata</i>	74
<i>Pinnularia</i> spp.	74
<i>Pleurosigma angularis</i>	76
<i>Pleurosigma angulatum</i>	76
<i>Pleurosigma formosum</i>	75, 76
<i>Pleurosigma</i> sp. A	76
<i>Pleurosigma</i> sp. B	76
<i>Pleurosigma</i> spp.	105
<i>Podocystis adriatica</i>	105
<i>Rhabdonema adriaticum</i>	74, 75, 76, 105
<i>Rhabdonema arcuatum</i>	105
<i>Rhizosolenia alata</i>	75, 76
<i>Rhizosolenia calcar-avis</i>	74, 75, 76
<i>Rhizosolenia setigera</i>	74, 75
<i>Rhizosolenia</i> spp.	74, 75, 76
<i>Rhopalodia gibberula</i>	105
<i>Striatella interrupta</i>	105
<i>Striatella unipunctata</i>	74, 76, 105
<i>Synedra bacillaris</i>	105
<i>Synedra hennedyana</i>	105
<i>Synedra tabulata</i>	105
<i>Synedra</i> cf. <i>ulna</i>	105
<i>Synedra</i> spp.	105
<i>Thalassionema nitzchioides</i>	74, 75, 76
<i>Thalassiothrix frauenfeldii</i>	74, 75, 76
<i>Thalassiothrix</i> spp.	74
<i>Trachyneis aspera</i>	74, 75, 76
<i>Trachyneis</i> sp.	75
<i>Tropidoneis lepidoptera</i>	74, 75
Undetermined sp. A	76

Undetermin. sp. B	76
Undertermn. sp. C	76
Undetermin. sp. D	76
Undetermin.	105

Macroalgae

<i>Acanthophora</i> sp.	*
<i>Dasya</i> sp.	*
<i>Acetabularia crenulata</i>	*
<i>Achrochaetium</i> spp.	105
<i>Bryopsis pennata</i>	31
<i>Caulerpa</i> sp.	*
<i>Ceramium byssoides</i>	*
<i>Cladophora delicula</i>	31
<i>Cladophora glaucescens</i>	31
<i>Cladosiphon</i> sp.	*
<i>Codium</i> sp.	22
<i>Derbesia vaucheriaeformis</i>	31
<i>Dictyota</i> sp	*
<i>Ectocarpus</i> sp.	*
<i>Enteromorpha flexuosa</i>	*
<i>Enteromorpha linza</i>	*
<i>Enteromorpha salina</i>	31
<i>Fosliella atlantica</i>	105
<i>Giffordia</i> sp.	*
<i>Gracillaria</i> sp.	87
<i>Halymenia</i> sp.	
<i>Hypnea</i> sp.	
<i>Laurencia</i> sp.	*
<i>Padina vickersiae</i>	*
<i>Polysiphonia denudata</i>	*
<i>Polysiphonia</i> sp.	22, 105
<i>Sargassum</i> sp.	22
<i>Ulva</i> sp.	22

Specimens from L. Keppner & D. Creamer

Appendix 3

Lichens and Fungi Reported from the St. Andrew Bay Estuary

1. $\text{E}(\text{E}(X)) = \text{E}(X)$
2. $\text{Var}(\text{E}(X)) = 0$

3. $\text{E}(\text{Var}(X)) = \text{Var}(\text{E}(X))$
4. $\text{Var}(\text{Var}(X)) > 0$

5. $\text{E}(\text{E}(X|Y)) = \text{E}(X)$
6. $\text{Var}(\text{E}(X|Y)) = 0$

7. $\text{E}(\text{Var}(X|Y)) = \text{Var}(\text{E}(X|Y))$
8. $\text{Var}(\text{Var}(X|Y)) > 0$

9. $\text{E}(\text{E}(X|Y_1, Y_2)) = \text{E}(X)$
10. $\text{Var}(\text{E}(X|Y_1, Y_2)) = 0$

11. $\text{E}(\text{Var}(X|Y_1, Y_2)) = \text{Var}(\text{E}(X|Y_1, Y_2))$
12. $\text{Var}(\text{Var}(X|Y_1, Y_2)) > 0$

Lichens	Habitat	Reference
<i>Cladonia leporina</i>	Coastal Scrub	*
Fungi		
<i>Clathrus</i> sp. 1	Coastal Scrub	***
<i>Clitocybe</i> sp. 1	Coastal Scrub	***
<i>Ganoderma</i> sp. 1	Coastal Scrub	***
<i>Guepiniopsis</i> sp. 1	Coastal Scrub	***
<i>Hygrocybe andersonii</i>	Coastal Scrub	**
<i>Leotia</i> sp. 1	Coastal Scrub	***
<i>Scoloderma</i> sp. 1	Coastal Scrub	***
<i>Suillus</i> sp. 1	Coastal Scrub	***

* direct observations

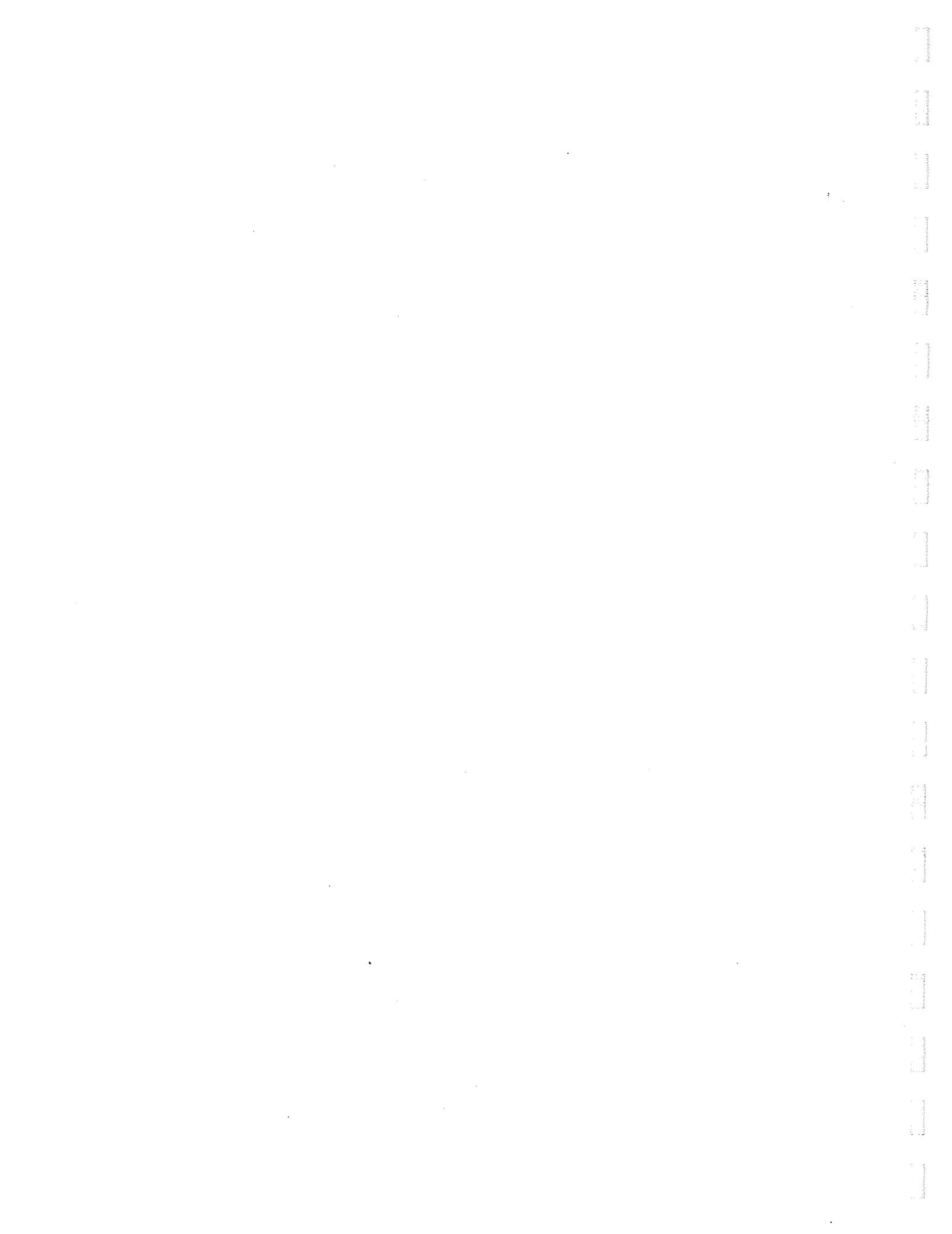
** from Ann Johnson, FNAI

*** L. Keppner collection

1. **Business Model**
2. **Market Segment**
3. **Value Proposition**
4. **Customer Segments**
5. **Customer Relationships**
6. **Revenue Streams**
7. **Key Activities**
8. **Key Resources**
9. **Key Partnerships**
10. **Cost Structure**
11. **Marketing & Sales**
12. **Operations**
13. **Human Resources**
14. **Financial Plan**

Appendix 4

Vascular Plants Reported from the St. Andrew Bay Estuary



Vascular Plants Reported from the St. Andrew Bay Estuary and Adjacent Terrestrial Habitats

Family	Genus and Species	Common Name	Habitat	Reference
Acanthaceae	<i>Ruellia noctiflora</i>	Nightflowering Wild Petunia	Coastal Marsh	*
Agavaceae	<i>Yucca aloifolia</i>	Spanish Bayonet	Coastal Scrub	*
Aizooceae	<i>Sesuvium portulacastrum</i>	Shoreline Seapurslane	Salt Marsh	*
Alismataceae	<i>Sagittaria lancifolia</i>	Bulbtongue Arrowhead	Tidal Marsh	*
Amaranthaceae	<i>Alternanthera philoxeroides</i>	Alligator-weed	Tidal Marsh	*
Amaryllidaceae	<i>Hymenocallis henryae</i>	Henry's Spiderlily	Marsh Edge	*
Apiaceae	<i>Centella asiatica</i>	Spadeflower	Marsh Edge	*
Apiaceae	<i>Hydrocotyle bonariensis</i>	Largeleaf Marshpennywort	Marsh Edge	*
Apiaceae	<i>Oxypolis filiformis</i>	Water Cowbane	Marsh	*
Apiaceae	<i>Oxypolis greenmanii</i>	Giant Water Dropwort	Marsh	*
Aquifoliaceae	<i>Ilex cassine</i>	Dahoon Holly	Marsh	*
Areccaceae	<i>Sabal palmetto</i>	Cabbage Palm	Flatwood	*
Areccaceae	<i>Serenia repens</i>	Saw Palmetto	Flatwood	*
Asclepiadaceae	<i>Cynanchum angustifolium</i>	Gulf Coast Swallowwort	Tidal Marsh	*
Asteraceae	<i>Ambrosia artemisiifolia</i>	Common Ragweed	Ruderal	*
Asteraceae	<i>Aster reticulatus</i>	Whitetop Aster	Flatwood	*
Asteraceae	<i>Aster subulatus</i>	Annual Saltmarsh Aster	Salt Marsh	*
Asteraceae	<i>Aster tenuifolius</i>	Perennial Saltmarsh Aster	Salt Marsh	*
Asteraceae	<i>Baccharis angustifolia</i>	Saltwater Falsewillow	Salt Marsh	*
Asteraceae	<i>Baccharis halimifolia</i>	Groundsel Tree	Salt Marsh	*
Asteraceae	<i>Bidens mitis</i>	Smallfruit Beggarticks	Flatwood	*
Asteraceae	<i>Borrichia frutescens</i>	Bushy Seaside Oxeye	Salt Marsh	*
Asteraceae	<i>Chrysopsis godfreyi</i>	Godfrey's Goldenaster	Beach	*
Asteraceae	<i>Erechtites hieracifolia</i>	Cottony Golden Aster	Flatwood	*
Asteraceae	<i>Eupatorium capillifolium</i>	Fireweed	Flatwood	*
Asteraceae	<i>Eupatorium mitchamoides</i>	Dogfennel	Flatwood	*
Asteraceae	<i>Eupatorium pilosum</i>	Sennaphe Thoroughwort	Tidal Marsh Edge	*
Asteraceae	<i>Eupatorium serotinum</i>	Rough Boneset	Flatwood	*
Asteraceae	<i>Gaillardia pulchella</i>	Lateflowering Thoroughwort	Beach	*
Asteraceae	<i>Helianthus debilis</i>	Fireweed	Beach	*
Asteraceae	<i>Iva frutescens</i>	Dune Sunflower	Beach	*
Asteraceae	<i>Iva imbricata</i>	Bigleaf Sumpweed	Salt Marsh	*
Asteraceae	<i>Mikania scandens</i>	Seacoast Marshelder	Salt Marsh	*
Asteraceae	<i>Palafoxia texana</i>	Climbing Hempvine	Tidal Marsh	*
Asteraceae		Texas Palafox	Beach	*

Vascular Plants Reported from the St. Andrew Bay Estuary and Adjacent Terrestrial Habitats

Asteraceae	<i>Pluchea odorata</i>	Sweet-scented	Flatwood
Asteraceae	<i>Pluchea rosea</i>	Rosy Camphorweed	Flatwood
Asteraceae	<i>Senecio glabellus</i>	Butterweed	Flatwood
Asteraceae	<i>Solidago sempervirens</i>	Seaside Goldenrod	Tidal Marsh
Avicenniaceae	<i>Avicennia germinans</i>	Black Mangrove	Salt Marsh
Batraceae	<i>Batis maritima</i>	Saltwort	Salt Marsh
Brassicaceae	<i>Cakile edentula</i>	Coastal Searocket	Beach
Bromeliaceae	<i>Tillandsia usneoides</i>	Spanish Moss	Scrub
Caprifoliaceae	<i>Sambucus canadensis</i>	Elderberry	Flatwood
Chenopodiaceae	<i>Atriplex pentandra</i>	Crested Saltbush	Beach
Chenopodiaceae	<i>Chenopodium ambrosioides</i>	Mexican Tea	Ruderal
Chenopodiaceae	<i>Salicornia virginica</i>	Perennial Glasswort	Salt Marsh
Convolvulaceae	<i>Calyptegia septium</i>	Hedge false Bindweed	Tidal Marsh
Convolvulaceae	<i>Ipomoea imperati</i>	Beach Morningglory	Beach
Convolvulaceae	<i>Ipomoea sagittata</i>	Saltmarsh Morningglory	Tidal Marsh
Cyperaceae	<i>Cladium jamaicense</i>	Jamaica Swamp Sawgrass	Brackish Marsh
Cyperaceae	<i>Cyperus esculentus</i>	Yellow Nutgrass	Marsh
Cyperaceae	<i>Cyperus odoratus</i>	Fragrant Flair-sedge	Marsh
Cyperaceae	<i>Eleocharis geniculata</i>	Canada Spikerush	Tidal Marsh Edge
Cyperaceae	<i>Fimbristylis caroliniana</i>	Carolina Fimbr. /	Salt Marsh
Cyperaceae	<i>Fimbristylis castanea</i>	Marsh Fimbr.	Salt Marsh
Cyperaceae	<i>Fuirena breviseta</i>	Saltmarsh Umbrellasedge	Salt Marsh
Cyperaceae	<i>Rhynchospora spp.</i>	Beaksedge	Various
Cyperaceae	<i>Scirpus americanus</i>	American Bulrush	Salt Marsh
Cyperaceae	<i>Scirpus robustus</i>	Saltmarsh Bulrush	Salt Marsh
Cyperaceae	<i>Scirpus validus</i>	Softstem Bulrush	Tidal Marsh
Cyperaceae	<i>Scleria reticularis</i>	Netted Nutrush	Marsh
Empetraceae	<i>Ceratiola ericoides</i>	Florida Rosemary	Dunes
Eriocaulaceae	<i>Eriocaulon spp.</i>	Pipeworts	Tidal Marsh
Eriocaulaceae	<i>Lachnocaulon engleri</i>	Engler's Bogbutton	Coastal Swale
Euphorbiaceae	<i>Croton glandulous</i>	Vene Conmigo	Beach
Euphorbiaceae	<i>Croton punctatus</i>	Gulf Croton	Beach
Fabaceae	<i>Clitoria mariana</i>	Atlantic Pidgeonwings	Shell Mound
Fabaceae	<i>Crotalaria pallida</i>	Smooth rattlebox	Brackish Marsh Edge
Fabaceae	<i>Galactia microphylla</i>	Eastern Milkpea	Beach
Fabaceae	<i>Indigofera caroliniana</i>	Carolina Indigo	Beach Edge
Fabaceae	<i>Lupinus westianus</i>	Gulf Coast Lupine	Beach

Vascular Plants Reported from the St. Andrew Bay Estuary and Adjacent Terrestrial Habitats

Fabaceae	<i>Srophostyles helvola</i>	Tailing Fuzzybean	Salt Marsh Edge
Fabaceae	<i>Vigna luteola</i>	Hairy Cowpea	Marsh
Fagaceae	<i>Quercus geminata</i>	Sand Live Oak	Scrub
Fagaceae	<i>Quercus virginiana</i>	Virginia Live Oak	Scrub
Gentianaceae	<i>Sabatia stellaris</i>	Rose-of-Plymouth	Tidal Marsh Edge
Haloragaceae	<i>Myriophyllum aquaticum</i>	Parrot Watermilfoil	Tidal Ditch
Hydrocharitaceae	<i>Halophila engelmannii</i>	Engleman's Seagrass	* & **
Hydrocharitaceae	<i>Thalassia testudinum</i>	Turtlegrass	Submerged
Juncaceae	<i>Juncus roemerianus</i>	Needle Rush	Submerged
Juncaceae	<i>Juncus validus</i>	Roundhead Rush	Salt Marsh
Juncaginaceae	<i>Triglochin striata</i>	Arrowgrass	Tidal Marsh
Lamiaceae	<i>Conradina canescens</i>	False Rosemary	Tidal Marsh
Lentibulariaceae	<i>Utricularia spp.</i>	Bladderworts	Brackish Marsh
Lythraceae	<i>Ammannia latifolia</i>	Toothcup	Brackish Marsh
Lythraceae	<i>Lythrum lineare</i>	Wand Loosestrife	Tidal Marsh Edge
Malvaceae	<i>Hibiscus grandiflorus</i>	Swamp Rosemallow	Tidal Marsh
Malvaceae	<i>Kosteletzya virginica</i>	Virginia Saltmarsh Mallow	Tidal Marsh
Myricaceae	<i>Myrica cerifera</i>	Wax Myrtle	Tidal Marsh
Oncgraceae	<i>Ludwigia alata</i>	Winged Primrosewillow	Coastal Swale
Oncgraceae	<i>Ludwigia peruviana</i>	Peruvian Primrosewillow	Brackish Marsh
Oncgraceae	<i>Ludwigia repens</i>	Creeping Primrosewillow	Brackish Marsh
Oncgraceae	<i>Oenothera humifusa</i>	Seabeach Eveningprimrose	Beach
Pinaceae	<i>Pinus clausa</i>	Sand Pine	Scrub
Pinaceae	<i>Pinus elliottii</i>	Slash Pine	Coastal Flatwoods
Pinaceae	<i>Pinus palustris</i>	Longleaf Pine	Coastal Flatwoods
Plumbaginaceae	<i>Limonium carolinianum</i>	Sea Lavender	Tidal Marsh
Poaceae	<i>Andropogon spp.</i>	Bluestem	Various
Poaceae	<i>Cenchrus tribuloides</i>	Sanddune Sandspur	Beach Edge
Poaceae	<i>Dichanthelium scoparium</i>	Velvet Witchgrass	Tidal Marsh
Poaceae	<i>Distichlis spicata</i>	Saltgrass	Salt Marsh
Poaceae	<i>Echinochloa walteri</i>	Coastal Cockspur	Marsh
Poaceae	<i>Erianthus giganteus</i>	Sugarcane Plumegrass	Marsh
Poaceae	<i>Panicum amarum</i>	Bitter Panicgrass	Beach
Poaceae	<i>Panicum anceps</i>	Beaked Panicgrass	Tidal Marsh
Poaceae	<i>Panicum rigidulum</i>	Redtop Panicum	Marsh
Poaceae	<i>Panicum spp.</i>	Panicgrass	Various
Poaceae	<i>Paspalum distichum</i>	Knotgrass	Brackish Marsh

Vascular Plants Reported from the St. Andrew Bay Estuary and Adjacent Terrestrial Habitats

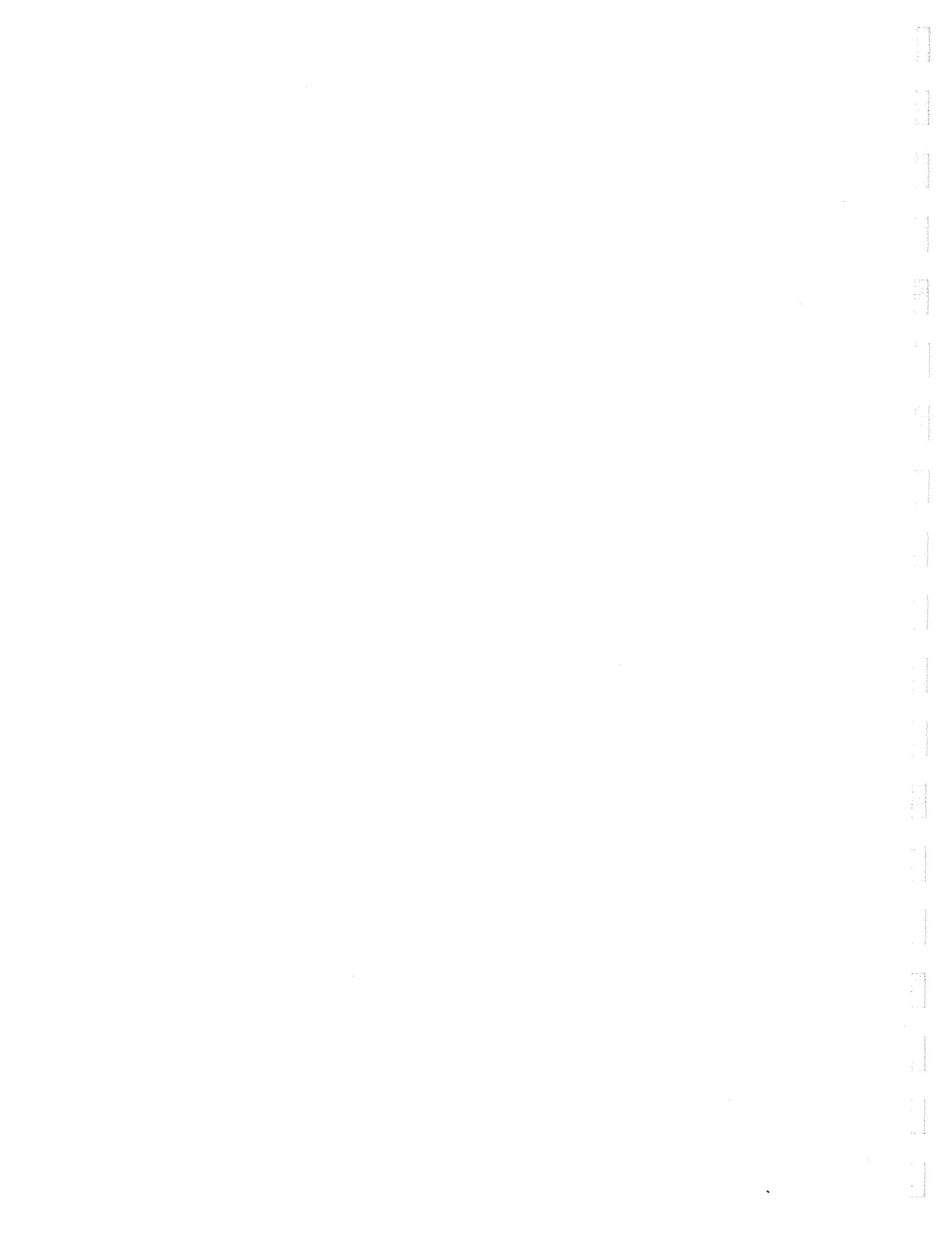
Poaceae	<i>Paspalum vaginatum</i>	Seashore Paspalum	Brackish Marsh
Poaceae	<i>Phragmites communis</i>	Common reed	Tidal Marsh
Poaceae	<i>Sacciolepis striata</i>	American Cupscale	Marsh
Poaceae	<i>Schizachyrium maritimum</i>	Little Bluestem	Beach
Poaceae	<i>Setaria geniculata</i>	Knotroot Foxtail	Tidal Marsh
Poaceae	<i>Setaria magna</i>	Giant Bristlegrass	Marsh
Poaceae	<i>Spartina alterniflora</i>	Smooth Cordgrass	Salt Marsh
Poaceae	<i>Spartina patens</i>	Saltmeadow Cordgrass	Tidal Marsh
Poaceae	<i>Spartina spartinae</i>	Gulf Cordgrass	Salt Marsh
Poaceae	<i>Sporobolus virginicus</i>	Seashore Dropseed	Tidal Marsh
Poaceae	<i>Uniola paniculata</i>	Sea Oats	Beach
Poaceae	<i>Yulpia octoflora</i>	Sixweeks Fescue	Beach
Polygonaceae	<i>Polygonella robusta</i>	Sandhill Fireweed	Beach
Polygonaceae	<i>Polygonum hydropiperoides</i>	Mild Waterpepper	Marsh
Polygonaceae	<i>Polygonum punctatum</i>	Dotted Smartweed	Marsh
Polygonaceae	<i>Rumex verticillatus</i>	Swamp Dock	Beach Edge
Polyodiaceae	<i>Blechnum serrulatum</i>	Toothed Midosus Fern	Swamp
Polyodiaceae	<i>Osmunda regalis</i>	Royal Fern	Swamp
Polyodiaceae	<i>Pteridium aquilinum</i>	Bracken Fern	Flatwood
Polyodiaceae	<i>Woodwardia virginica</i>	Virginia Chain Fern	Swamp
Primulaceae	<i>Samolus parviflorus</i>	Pineeland Pimpernel	Flatwood
Rhamnaceae	<i>Sageretia minutiflora</i>	Small Flower Mock Buckthorn	Shell Mound
Rubiaceae	<i>Diodia teres</i>	Poor Joe	Beach Edge
Rubiaceae	<i>Ruppia maritima</i>	Widgeongrass	Submerged
Rutaceae	<i>Zanthoxylum clava-herculis</i>	Hercules'-club	Flatwood
Salicaceae	<i>Salix caroliniana</i>	Carolina Willow	Swamp
Salvinaceae	<i>Salvinia minima</i>	Water Spangles	Tidal Canal
Scrophulariaceae	<i>Agalinis maritima</i>	Saltmarsh False Foxglove	Brachish Marsh
Scrophulariaceae	<i>Bacopa monnieri</i>	Herb-of-Grace	Marsh
Smilacaceae	<i>Scoparia dulcis</i>	Sweetbroom	Tidal Marsh Edge
Smilacaceae	<i>Smilax laurifolia</i>	Earleaf Greenbrier	Beach
Solanaceae	<i>Physalis angulata</i>	Bamboo-vine	Flatwood
Typhaceae	<i>Typha domingensis</i>	Culleaf Groundcherry	Beach
Typhaceae	<i>Typha latifolia</i>	Southern Cattail	Marsh
Urticaceae	<i>Boehmeria cylindrica</i>	Broadleaf Cattail	Marsh
Vitaceae	<i>Vitis rotundifolia</i>	False Nettle	Swamp
		Muscadine	Scrub

Vascular Plants Reported from the St. Andrew Bay Estuary and Adjacent Terrestrial Habitats

5

Xyridaceae	<i>Xyris caroliniana</i>	Carolina Yellow-eyed Grass	Tidal Marsh Edge	*
Zannichelliaceae	<i>Halodule wrightii</i>	Shoalweed	Submerged	107,*
Zannichelliaceae	<i>Syringodium filiforme</i>	Manateegrass	Submerged	19, 20, 32, 107,*

* from Keppner & Keppner
** Fonseca pers.comm, NMFS



Appendix 5

Zooplankton Reported From the St. Andrew Bay Estuary

Group	Genus & Species	Reference
Protozoa		
	<i>Amphorides amphora</i>	30
	<i>Amphorides brandti</i>	16, 30
	<i>Amphorellopsis acuta</i>	30
	<i>Codonellopsis obesa</i>	30
	<i>Coxliella longa</i>	16, 30
	<i>Eutintinnus mediuss</i>	30
	<i>Eutintinnus pinguis</i>	30
	<i>Eutintinnus tenuis</i>	16, 30
	<i>Eutintinnus tubulosa</i>	30
	<i>Favella panamensis</i>	30
	<i>Favella taraikaensis</i>	30
	<i>Helicostomella subulata</i>	16, 30
	<i>Metacyclis meresschkowskii</i>	16
	<i>Metacyclis</i> sp. 1	16
	<i>Metacyclis</i> sp. 2	16
	<i>Stylicauda platensis</i>	16, 30
	<i>Tintinnidium mucicola</i>	30
	<i>Tintinnopsis beroidea</i>	16
	<i>Tintinnopsis beutschlii</i>	30
	<i>Tintinnopsis brandti</i>	16, 30
	<i>Tintinnopsis cylindria</i>	16, 30
	<i>Tintinnopsis kofoidi</i>	30
	<i>Titinnopsis levigata</i>	30
	<i>Titinnopsis mortensenii</i>	30
	<i>Titinnopsis parvula</i>	30
	<i>Titinnopsis radix</i>	30
	<i>Tintinnopsis tocantinensis</i>	30
	<i>Tintinnopsis tubulosa</i>	30
Hydromedusae (Coelenterata)		
	<i>Aglaura hemistoma</i>	30
	<i>Bouganvillia carolinensis</i>	30
	<i>Cunina octonaria</i>	30
	<i>Dipurena ophiogaster</i>	30
	<i>Dipurena strangulata</i>	30
	<i>Ectopleura dumortieri</i>	30
	<i>Eirene pyramidalis</i>	30
	<i>Eucheilota duodecimalis</i>	30
	<i>Eucheilota ventricularis</i>	30
	<i>Euphypha aurata</i>	30
	<i>Euphsora gracilis</i>	30
	<i>Eutima variabilis</i>	30
	<i>Liriope tetraphylla</i>	30
	<i>Nemopsis bachei</i>	30
	<i>Obelia</i> sp.	30
	<i>Persa incolorata</i>	30
	<i>Phialidium folleatum</i>	30
	<i>Phialidium carolinae</i>	30

<i>Podocoryne minima</i>	30
<i>Podocoryne minuta</i>	30
<i>Poboscidactyla ornata</i>	30
<i>Rhopalonema velatum</i>	30
<i>Sarsia</i> sp.	30
<i>Solmaris</i> sp.	30

Siphonophora (Coelenterata)

<i>Agalma</i> sp.	30
<i>Bassia bassensis</i>	30
<i>Diphyes dispar</i>	30
<i>Enneagonum hyalinum</i>	30
<i>Muggiae kochi</i>	30

Ctenophora

<i>Beroe ovata</i>	*
<i>Pleurobranchia pileus</i>	*
<i>Mnemiopsis</i>	98

* = M. Brim class notes, GCCC

Rotifera

<i>Rotifer C</i>	30
<i>Synchaeta</i> sp.	30
<i>Trichocerca marina</i>	30

Mollusca

<i>Creseis acicula</i>	30
<i>Desmopterus papilio</i>	30
<i>Protatlanta souleveti</i>	30
Pteropod A	30

Polychaeta

<i>Tomopteris mariana</i>	30
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Copepoda (Arthropoda)

<i>Acartia tonsa</i>	30
<i>Anomlocerca ornata</i>	30
<i>Calanopia americana</i>	30
<i>Candacia</i> sp.	30
<i>Centropages furcatus</i>	30, 111
<i>Centropages hamatus</i>	30
<i>Clausocalanus furcatus</i>	30
<i>Clytemnestra rostrata</i>	30
<i>Copepod nauplii</i>	30
<i>Corycaeus amazonicus</i>	30
<i>Corycaeus americanus</i>	30
<i>Coryaceus carinata</i>	
<i>Corycaeus giesbrechti</i>	30
<i>Coryceus latus</i>	30
<i>Corycaeus speciosus</i>	30
<i>Corycaeus</i> spp.	30

<i>Corycella carinata</i>	30
<i>Eucalanus monachus</i>	111
<i>Eucalanus pileatus</i>	30
<i>Euterpina acutifrons</i>	30
Harpacticoids	30
<i>Hemicyclops</i> sp.	30
<i>Kelleria</i> sp.	30
<i>Labidocera aestiva</i>	30
<i>Microsetella norvegica</i>	30
<i>Oithona brevicornis</i>	98
<i>Oithona nana</i>	30
<i>Oithona plumifera</i>	30
<i>Oithona simplex</i>	30
<i>Oncaeа curta</i>	30
<i>Oncaeа venusta</i>	30
<i>Paracalanus aculeatus</i>	30
<i>Paracalanus crassirostris</i>	30
<i>Paracalanus parvus</i>	30
<i>Pseudodiaptomus coronatus</i>	30
<i>Temora stylifera</i>	30
<i>Temora turbinata</i>	30
<i>Tortanus setacaudatus</i>	30
<i>Undinula vulgaris</i>	30
 Cladocera (Arthropoda)	
<i>Evadne tergestina</i>	30
<i>Penilia avirostris</i>	30
<i>Podon polyphemoides</i>	30
 Ostracoda (Arthropoda)	
<i>Euconchoecia chierchiai</i>	30
 Amphipoda (Arthropoda)	
<i>Hyperia atlantica</i>	30
<i>Simorhynchotus antennarius</i>	30
<i>Listrigonis bengalensis</i>	98
 Mysidacea (Arthropoda)	
<i>Americamysis alleni</i>	98
<i>Americamysis almyra</i> (= <i>Mysidopsis</i> ?)	98
<i>Americamysis stucki</i>	98
<i>Anchialina typica</i>	98
<i>Gasterosaccus dissimilis</i>	30
<i>Metamysidopsis munda</i>	30
<i>Metamysidopsis swifti</i>	98
<i>Mysidopsis almyra</i>	30
 Decopoda (Arthropoda)	
<i>Lucifer faxoni</i>	30

Chaetognatha

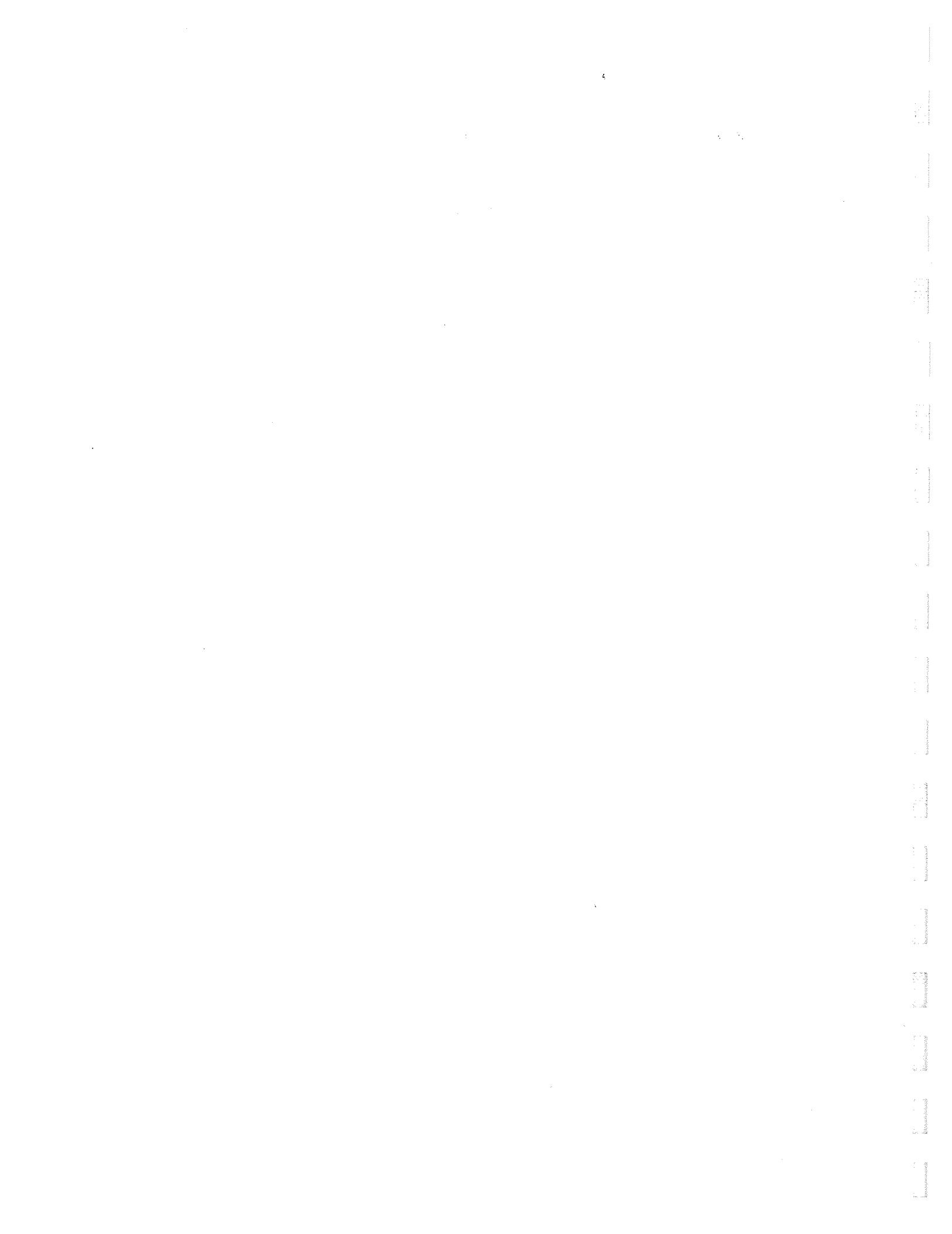
<i>Krohnitta pacifica</i>	71
<i>Sagitta enflata</i>	30, 71
<i>Sagitta heleneae</i>	30, 71
<i>Sagitta hispida</i>	30, 71
<i>Sagitta tenius</i>	30, 71
<i>Sagitta</i> sp.	30
<i>Spadella</i> sp.	14, 30

Pelagic Tunicates (Urochordata)

<i>Appendicularia sicula</i>	30
<i>Cyclosalpida floridana</i>	30
<i>Dolioletta geggenbauri</i>	30
<i>Fritillaria borealis</i>	30
<i>Fritillaria formica</i>	30
<i>Fritillaria haplostoma</i>	30
<i>Kowalevskia tenuis</i>	30
<i>Oikopleura cornustogastra</i>	30
<i>Oikopleura dioica</i>	30
<i>Oikopleura fusiformis</i>	30
<i>Oikopleura longicauda</i>	30
<i>Oikopleura rufescens</i>	30

Appendix 6

Benthic and Epibenthic Organisms Reported from the St. Andrew Bay Estuary



Group	Genus and Species	Reference
Protozoa		
	<i>Ammobaculites salsa</i>	61
	<i>Ammobaculites exiguum</i>	61
	<i>Ammonia parkinsonian tepida</i>	61
	<i>Ammonia parkinsonian typica</i>	61
	<i>Angulogerina carinata bradyana</i>	61
	<i>Arenoparrella mexicana</i>	61
	<i>Articulina majori</i>	61
	<i>Asterigerina carinata</i>	61
	<i>Bigenerina irregularis</i>	61
	<i>Brizalina lowmani</i>	61
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<i>Cranilla cinachyra</i>	14, 80
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<i>Halichochondria panicea</i>	55
<i>Haliclona permollis</i>	55
<i>Halicometes stellata</i>	55
<i>Hymeniacidon heliophila</i>	55
<i>Ircinea fasciculata</i>	14, 80, *
<i>Lissodendoryx isodictyalis</i>	*
<i>Microciona prolifera</i>	*
Porifera undetermin.	75, 76, 77
<i>Scypha acanthoxea</i>	55
<i>Spheciospongia vesparia</i>	*
<i>Suberites sp.</i>	89
<i>Terpios zeteki</i>	*
<i>Xestospongia halichondroides</i>	*

* = Class notes, M. Brim

Coelenterata (= Cnidaria)

<i>Actinaria</i> sp.	32
Actinarians undeterminn.	74, 75, 76
<i>Actinaria</i> sp.	99
Anemones undeterminn.	76
<i>Anemonia sargassensis</i>	4
Anthozoa undeterminn.	69, 76, 77
<i>Aiptasia pallida</i>	*
<i>Astrangia</i> sp.	76
<i>Athenaria</i> sp.	53
<i>Aurelia aurita</i>	*
<i>Bunodactes stelloides</i>	*
<i>Bunodesma</i> sp.	22
<i>Calliactis tricolor</i>	*
<i>Campanularia</i> sp.	74, 88
<i>Cerianthus americanus</i>	*
<i>Cerianthus</i> sp.	22
<i>Chiropsalmus quadrumanus</i>	*
<i>Chrysaora quinquecirrha</i>	*
<i>Cyanea capillata</i>	88
<i>Edwardsia cf. leidyi</i>	88
<i>Edwardsia</i> sp. A	69, 74, 75
Hydrozoa undeterminn.	75, 76, 77
<i>Leptogorgia virgulata</i>	*
<i>Oculina</i> sp.	*
<i>Pennaria tiarella</i>	*
<i>Physalia</i> sp.	*
<i>Renilla mulleri</i>	111, *
<i>Stomolophus meleagris</i>	*

* = Class notes, M. Brim

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<i>Ascocotyle leei</i>	*
<i>Ascocotyle tenuicollis</i>	*
<i>Bdelloura</i> sp.	*
<i>Euplana gracilis</i>	53
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Turbellaria	32

* from Foster pers. Comm

Gastropoda

<i>Gastroticha</i> sp.	author's collection
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Kinorhyncha

<i>Kinorhyncha</i> sp.	author's collection
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Nematomorpha

<i>Nectonema</i> sp.	14
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Nematoda

<i>Acanthopharynx</i> sp.	**
<i>Adoncholaimus lepidus</i>	*
<i>Anonchus</i> sp.	**
<i>Anaplostoma copano</i>	*
<i>Anticoma asupplmenta</i>	36
<i>Anticoma chitwoodi</i>	*
<i>Anticoma litoris</i>	*
<i>Anticoma</i> sp. 1	*
<i>Anticoma</i> sp. 2	*
<i>Ascolaimus</i> sp.	**
<i>Axonolaimus cf. spinosus</i>	**
<i>Axonolaimus</i> sp. 1	**
<i>Axonolaimus</i> sp. 2	**
<i>Axonolaimus</i> sp. 3	**
<i>Bathylaimus australis</i>	*
<i>Bathylaimus capacosus</i>	*
<i>Bathylaimus longicorpus</i>	38
<i>Bolbellia</i> sp.	*
<i>Bolbolaimus chitwoodi</i>	**
<i>Bolbolaimus cf. wieseri</i>	**
<i>Calyptronema hoppermeyersi</i>	*
<i>Calyptronema cobbi</i>	*
<i>Calyptronema</i> sp.	*
<i>Camacolaimus pritherchi</i>	**
<i>Camacolaimus tarda</i>	**
<i>Campylolaimus</i> sp.	**
<i>Catanema</i> sp.	**
<i>Ceramonema</i> sp. 1	**
<i>Ceramonema</i> sp. 2	**
<i>Cheironchus vorax</i>	*
<i>Chromadoropsis</i> sp.	**
<i>Comesoma cf. bermudensis</i>	**
<i>Comesoma minimum</i>	**
<i>Comesoma</i> sp. 1	**
<i>Cricolaimus elongata</i>	43
<i>Cyartonema flexible</i>	**
<i>Cyartonema</i> sp.	**
<i>Cylcolaimus magnus</i>	*
<i>Cytolaimum exile</i>	*
<i>Daptonema</i> sp. 1	**
<i>Daptonema</i> sp. 2	**
<i>Desmodora</i> sp. 1	**
<i>Desmodora</i> sp. 2	**
<i>Desmodorella</i> sp.	**
<i>Desmoscolex cf. laevis</i>	**
<i>Desmoscolex</i> sp. 1	**
<i>Desmoscolex</i> sp. 2	**
<i>Didelta</i> sp.	**
<i>Diplopeltoides</i> sp.	**
<i>Diplopeltula</i> sp. 1	**

<i>Diplopeltula</i> sp. 2	**
<i>Diplopeltula</i> sp. 3	**
<i>Diodontolaimus parasbulosus</i>	43
<i>Disconema</i> sp.	**
<i>Dorylaimopsis metatypica</i>	**
<i>Dorylaimopsis punctat</i>	**
<i>Echinodesmodora</i> sp.	**
<i>Elzalia</i> sp.	**
<i>Enoploides bisulcus</i>	*
<i>Enoploides gryphus</i>	*
<i>Enoploides cf. polysetosus</i>	*
<i>Enoploides</i> sp.	*
<i>Enoplolaimus asymmetricus</i>	35
<i>Enoplolaimus pararegius</i>	36
<i>Enoplolaimus enatus</i>	*
<i>Enoplus michaelsoni</i>	*
<i>Epacanthion oweni</i>	33
<i>Epacanthion</i> sp.	*
<i>Eubostrichus dianae</i>	**
<i>Eubostrichus parasitifera</i>	**
<i>Euchromadora</i> sp. 1	**
<i>Euchromadora</i> sp. 2	**
<i>Euchromadora</i> sp. 3	**
<i>Eurystomina americana</i>	*
<i>Eurystomina minutisculae</i>	*
<i>Eurystomina olsonae</i>	36
<i>Filoncholaimus</i> sp.	*
<i>Gammanema</i> sp.	**
<i>Gomphionema typicum</i>	**
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<i>Halalaimus brimi</i>	42
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<i>Halalaimus floridanus</i>	42
<i>Halalaimus paracomatus</i>	42
<i>Halalaimus parasfletcheri</i>	42
<i>Halalaimus tarjani</i>	42
<i>Halalaimus thalassinus</i>	42
<i>Halalaimus variabilis</i>	42
<i>Halalaimus</i> sp.	*
<i>Halanonchus macrurus</i>	*
<i>Halanonchus</i> sp.	*
<i>Halichoanolaimus duodecempapillatus</i>	*
<i>Halichoanolaimus macroscopiculatus</i>	*
<i>Halichoanolaimus quattuordecimpapillatus</i>	*
<i>Haliplectus</i> sp.	**
<i>Innocuonema</i> sp.	**
<i>Ironella prismaticolaimus</i>	37
<i>Lauratonema reniamphidum</i>	*
<i>Laimella</i> cf. <i>vera</i>	**
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<i>Latronema</i> sp. 1	**
<i>Latronema</i> sp. 2	**
<i>Leptolaimus</i> sp.	**
<i>Leptosomatoides cf. marinae</i>	*
<i>Leptosomatum</i> sp. 1	*
<i>Leptosomatum</i> sp. 2	*
<i>Linhomoeus</i> sp.	**
<i>Marylynnia eratos</i>	**
<i>Megadesmolaimus</i> sp. 1	**
<i>Mesacanthion southerni</i>	*
<i>Mesacanthion brevicaudatus</i>	36
<i>Mesacanthoides fibulatus</i>	*
<i>Metacomesoma cyatholaimoides</i>	**
<i>Metacomesoma quadrisetosa</i>	**
<i>Metacomesoma</i> sp.	**
<i>Metachromadora</i> sp.	**
<i>Metadasylaimella</i> sp.	**
<i>Metadesmolaimus</i> sp.	**
<i>Metalinhomoeus</i> sp. 1	**
<i>Metalinhomoeus</i> sp. 2	**
<i>Metonyx</i> sp.	**
<i>Metoncholaimus amplus</i>	*
<i>Metoncholaimus parasimplex</i>	34
<i>Metoncholaimus pelor</i>	*
<i>Metoncholaimus</i> sp. 1	**
<i>Metoncholaimus</i> sp. 2	**
<i>Meyersia minor</i>	*
<i>Microlaimus</i> sp. 1	**
<i>Microlaimus</i> sp. 2	**
<i>Microlaimus</i> sp. 3	**
<i>Monocholaimus cf. parasetosus</i>	*
<i>Monocholaimus separabilis</i>	*
<i>Monocholaimus</i> sp. 1	**
<i>Monocholaimus</i> sp. 2	**
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<i>Monoposthia hexalata</i>	44
<i>Monoposhtiodes mayri</i>	44
<i>Nannolaimus</i> sp.	**
<i>Nemanema cylindraticaudatum</i>	*
<i>Nemanema</i> sp.	*
<i>Nematoda undetermn.</i>	69, 74, 75, 76, 77
<i>Neochromadora</i> sp. 1	**
<i>Neochromadora</i> sp. 2	**
<i>Neonyx</i> sp.	**
<i>Neotonchoides</i> sp.	**
<i>Nygmatonchus</i> sp. 1	**
<i>Nygmatonchus</i> sp. 2	**
<i>Nygmatonchus</i> sp. 3	**
<i>Odontophora articulata</i>	38
<i>Odontophora brevispicula</i>	38
<i>Odontophora carrolli</i>	38

<i>Oncholaimellus carlbergi</i>	*
<i>Oncholaimellus labiatus</i>	*
<i>Oncholaimellus patkellyi</i>	34
<i>Oncholaimellus</i> sp.	*
<i>Oncholaimium appendiculatum</i>	*
<i>Oncholaimium</i> sp. 1	*
<i>Oncholaimium</i> sp. 2	*
<i>Oncholaimium sheri</i>	*
<i>Oncholaimoides elongatus</i>	45
<i>Oncholaimoides rugosus</i>	45
<i>Oncholaimoides striatus</i>	45
<i>Oncholaimus brevicaudatus</i>	*
<i>Oncholaimus cf. campylocercoides</i>	*
<i>Oncholaimus dujardini</i>	*
<i>Oncholaimus oxyuris</i>	*
<i>Oncholaimus</i> sp.	**
<i>Onyx</i> sp.	**
<i>Oxyonchus striatus</i>	39
<i>Oxystomina cf. alpatovi</i>	*
<i>Oxystomina alpha</i>	*
<i>Oxystomina elongata</i>	*
<i>Oxystomina miranda</i>	*
<i>Oxystomina cf. novozemlica</i>	**
<i>Oxystomina</i> sp.	*
<i>Paracomesoma hexasetosa</i>	**
<i>Paracyatholaimus</i> sp. 1	**
<i>Paracyatholaimus</i> sp. 2	**
<i>Paralinhomoeus</i> sp.	**
<i>Paramonhystera</i> sp. 1	**
<i>Paramonhystera</i> sp. 2	**
<i>Pararaeolaimus</i> sp.	*
<i>Paraphanolaimus bayensis</i>	38
<i>Paratarvaia</i> sp.	**
<i>Pareurystomina acuminata</i>	40
<i>Pareurystomina agubernacula</i>	33, 40
<i>Pareurystomina alima</i>	40
<i>Pareurystomina americana</i>	40
<i>Pareurystomina atypica</i>	40
<i>Pareurystomina bissonettei</i>	40
<i>Pareurystomina flagellicaudata</i>	40
<i>Pareurystomina floridensis</i>	33, 40
<i>Pareurystomina parafloridensis</i>	40
<i>Pareurystomina vaughiae</i>	40
<i>Parodontophora brevamphida</i>	**
<i>Parodontophora</i> sp.	**
<i>Pelagonema</i> sp.	*
<i>Phanoderma cf. serratum</i>	*
<i>Phanoderma</i> sp.	*
<i>Phanodermopsis longisetae</i>	*
<i>Plectolaimus supplementus</i>	38
<i>Polygastrophora edax</i>	*

<i>Pomponema</i> sp.	**
<i>Pontonema</i> sp.	**
<i>Preaeacanthonchus</i> sp.	**
<i>Procamacolaimus</i> sp.	**
<i>Prochromadora</i> sp.	**
<i>Prooncholaimus banyulensis</i>	*
<i>Prooncholaimus hastatus</i>	*
<i>Pselionema hexalatum</i>	**
<i>Pselionema rigidum</i>	**
<i>Pseudocella</i> sp.	*
<i>Pseudonchus</i> sp.	**
<i>Pseudochromadora</i> sp.	**
<i>Pterygonema platti</i>	**
<i>Ptycholaimellus</i> sp.	**
<i>Rhabdodemania minima</i>	*
<i>Rhabdodemania</i> sp.	*
<i>Richtersia</i> sp.	**
<i>Rhips</i> sp.	**
<i>Rhynchonema</i> sp.	**
<i>Sabateria celtica</i>	**
<i>Sabateria hilarula</i>	**
<i>Sabateria longispina</i>	**
<i>Sabatria cf. pomari</i>	**
<i>Sabateria pulchra</i>	**
<i>Sabateria punctatum</i>	**
<i>Scaptrella</i> sp.	**
<i>Siphonolaimus</i> sp.	**
<i>Spilophorella</i> sp. 1	**
<i>Spilophorella</i> sp. 2	**
<i>Spirinia</i> sp.	**
<i>Stygodesmodora</i> sp.	**
<i>Symplocostoma</i> sp. 1	**
<i>Symplocostoma</i> sp. 2	**
<i>Symplocostomella</i> sp.	**
<i>Synonchiella hopperi</i>	*
<i>Synonchiella</i> sp. 1	**
<i>Synonchiella</i> sp. 2	**
<i>Tarvaiia cladara</i>	**
<i>Tershellingia</i> sp. 1	**
<i>Tershellingia</i> sp. 2	**
<i>Thalassironus americanus</i>	33, 37
<i>Thalassironus britanicus</i>	37
<i>Thalassironus lynnae</i>	37
<i>Thalassironus thalassinus</i>	41
<i>Thalassoalimus tardus</i>	*
<i>Thalassoalimus septentrionalis</i>	*
<i>Theristus</i> sp. 1	*
<i>Theristus</i> sp. 2	**
<i>Theristus</i> sp. 3	**
<i>Theristus</i> sp. 4	**
<i>Theristus</i> sp. 5	**

<i>Thoonchus longisetosus</i>	**
<i>Thoracostomopsis</i> sp.	*
<i>Trefusia americana</i>	43
<i>Trefusia honesti</i>	33
<i>Trefusia longicorpa</i>	33
<i>Trefusia spatulata</i>	43
<i>Trichotheristus</i> sp.	**
<i>Tricoma</i> sp. 1	**
<i>Tricoma</i> sp. 2	**
<i>Tricoma</i> sp. 3	**
<i>Trileptium americanum</i>	36
<i>Tripetium</i> sp.	*
<i>Tripyloides septentrionalis</i>	*
<i>Viscosa bayensis</i>	34
<i>Viscosa cf. brachylaimoides</i>	*
<i>Viscosa floridana</i>	34
<i>Viscosa glabra</i>	*
<i>Viscosa macramphida</i>	*
<i>Viscosa macrobursata</i>	34
<i>Viscosa papillata</i>	*
<i>Viscosa papillatooides</i>	*
<i>Viscosa paralinstowi</i>	*
<i>Viscosa</i> sp.	*
<i>Xennella</i> sp.	**
<i>Xyala</i> sp. 1	**
<i>Xyala</i> sp. 2	**

* = specimen sent to U.S. National Museum

** = specimen in author's collection

Nemertinea (= Rhynchocoela)

<i>Amphiporus</i> sp.	88
<i>Carinonema tremophoros</i>	89
<i>Cerebratulus lacteus</i>	14, 80, 89
<i>Cerebratulus</i> sp.	88
<i>Lineus socialis</i>	14, 80
<i>Nemertinea</i> sp.	14, 53, 69
<i>Nemertinea undertermn,</i>	74, 75, 76, 77
Rhynchocoela	32, 75, 76
<i>Tetrastemma candidum</i>	14, 89
<i>Tetrastemma vermicularis</i>	14, 80
<i>Tetratemma</i> sp.	88
<i>Tubulanus</i> sp.	99

Phoronida

<i>Phoronis architecta</i>	69, 74, 76, 77
<i>Phoronis</i> sp.	32

Ectopocta (Bryozoa)

<i>Aetea truncata</i>	70
<i>Beania intermedia</i>	70
<i>Bowerbankia</i> sp. 1	88

<i>Bugula neritina</i>	70
<i>Bugula</i> sp.	76
<i>Electra bella</i>	70
<i>Electra laciniosa</i>	70
<i>Membranipora tenuis</i>	70
<i>Membranipora</i> sp.	74, 88, 98
<i>Schizoporella unicornis</i>	70
Brachiopoda	
Brachiopoda	32
<i>Glottidia pyramidata</i>	75, 76, 77
Sipunculida	
<i>Aspidosiphon albus</i>	32
<i>Aspidosiphon</i> sp.	76, 77
<i>Phascolion strombi</i>	14, 32, 69, 74, 75, 76, 77, 80, 99
<i>Phascolion</i> sp.	89
<i>Phascolosoma verrilli</i>	88
Sipunculida undetermn.	75, 77
<i>Sipunculus nudus</i>	32, 76, 77
Sipunculidae	32
Echinodermata	
<i>Allothyone mexicana</i>	32
<i>Amphiodia pulchella</i>	69, 74, 75, 76, 77
<i>Amphioplus abditus</i>	14, 69, 74, 75, 76, 77, 89
<i>Amphioplus thrombodes</i>	69, 74, 75, 76, 77, 89
<i>Amphioplus</i> sp.	77
<i>Amphiopholis gracillima</i>	14, 80, 99
Amphuridae	32
<i>Arbacia punctulata</i>	74, 77
<i>Astropecten articulatus</i>	*
cf. <i>Echinarchius</i>	89
<i>Echinaster spinulosus</i>	Koe
<i>Echinoidea</i> undetermn.	77
<i>Hemipholis elongata</i>	76, 77
Holothuria undetermn.	14, 75, 76, 77
<i>Leptosynapta crassipatina</i>	32
<i>Leptosynapta tenius</i>	89
<i>Leptosynapta</i> sp. A	69, 75, 76
<i>Leptosynapta</i> s.p. A	74, 76, 77
<i>Luidia alternata</i>	*
<i>Luidia clathrata</i>	*
<i>Lytechinus variegatus</i>	20, 75, 76, 77, 89, 94,*
<i>Mellita quinquesperforata</i>	32, 75, 76, 77, 89
Mellitidae	32
<i>Micropholis atra</i>	32, 53, 75, 76, 77
<i>Micropholis gracillima</i>	76, 77
<i>Moira atrops</i>	75, 76, 77
<i>Ophioderma brevispina</i>	11, 32, 69, 74, 75, 76, 77, 89
<i>Ophiophragmus filograneus</i>	20, 52, 69, 75, 76, 77, 89

<i>Ophiophragmus moori</i>	69, 74, 75, 76, 77
<i>Ophiophragmus</i> sp.	32
<i>Ophiothrix angulata</i>	77, *
<i>Ophiothrix</i> sp.	89
<i>Ophiuroidea</i> undeterminn.	
<i>Pentamera pulcherima</i>	76, 77
Phyllophoridae	32
<i>Stolus cognatus</i>	32
<i>Theelothuria princeps</i>	14, *
<i>Thyone briarius</i>	14
<i>Thyone</i> sp.	69, 74, 75, 76, 77

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<i>Balangolossus aurantiacus</i>	32
<i>Enteropneusta</i> undeterminn.	69, 74, 76, 77

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<i>Amaroucium stellatum</i>	7
<i>Amaroucium</i> sp.	89
<i>Ascidacea</i> undeterminn.	32, 75, 76, 77
<i>Didemnum candidura</i>	7
<i>Molgula</i> sp.	53, 89
<i>Polyandrocarpa tincta</i>	7
<i>Pyura vittata</i>	69, 74
<i>Styela partita</i>	89
<i>Styela plicata</i>	7
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Appendix 7

Annelida Reported from the St. Andrew Bay Estuary

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	<i>Ampharete americana</i>	53
	<i>Ampharete undetermn.</i>	14, 32, 80
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	<i>Anaitides erythrophyllus</i>	69, 74
	<i>Ancistrosyllis hartmannae</i>	53, 75, 76, 77
	<i>Ancistrosyllis jonesi</i>	53, 76, 77
	<i>Ancistrosyllis</i> sp. C	32
	<i>Ancistrosyllis</i> sp.	32, 53
	<i>Aonides mayaguezensis</i>	75, 76, 77
	<i>Apropionospio pygmaea</i>	32, 75, 76, 77
	<i>Arabella iricolor</i>	69, 74, 75, 76, 77
	<i>Arabella mutans</i>	89
	<i>Arabellides oculata</i>	99
	<i>Arabellidae</i> sp.	32, 89
	<i>Arenicola cristata</i>	53, 69, 74, 76, 77
	<i>Arenicola marina</i>	76, 77
	<i>Aricidea catherinae</i>	14, 75, 77, 80
	<i>Aricidea cerrutii</i>	75, 77
	<i>Aricidea fragilis</i>	69, 74, 75, 76, 77
	<i>Aricidea philibinae</i>	14, 32, 53, 75, 76, 77, 80, 89, 92, 99
	<i>Aricidea suecica</i>	14, 80
	<i>Aricidea taylori</i>	14, 32, 53, 69, 74, 75, 76, 77, 80, 99
	<i>Aricidea</i> sp. A	14, 32, 53, 69, 74, 75, 76, 77, 80
	<i>Aricidea</i> sp. B	14, 32, 80
	<i>Aricidea</i> sp. E	14, 32, 80
	<i>Aricidea</i> sp.	14, 32, 77, 80
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	<i>Aricidea</i> sp. 3	14, 80
	<i>Aricidea</i> sp. 5	14, 80
	<i>Armandia agilis</i>	14, 32, 53, 80, 89
	<i>Armandia maculata</i>	14, 32, 42, 53, 69, 74, 75, 76, 77, 80, 99
	<i>Armandia</i> sp.	32
	<i>Asychis elongatus</i>	14, 32, 53, 80
	<i>Asychis</i> sp.	14, 80
	<i>Autolytus</i> sp. A	69, 74, 75, 76
	<i>Autolytus</i> sp.	77
	<i>Axiothella mucosa</i>	32, 53, 69, 74, 75, 76, 77, 92
	<i>Axiothella</i> sp. A	89
	<i>Barantolla</i> sp.	14, 80
	<i>Bhawania heteroleta</i>	32
	<i>Boccardia hamata</i>	77
	<i>Boquea enigmatica</i>	75, 76, 77

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<i>Branchiostoma floridae</i>	14, 32, 69, 74, 75, 76, 77, 82
<i>Branchiosyphis americana</i>	69, 74, 76, 77
<i>Brania clavata</i>	32, 53, 69, 74, 75, 76, 77, 89
<i>Brania wellfleetensis</i>	14, 32, 75, 76, 77, 80
<i>Brania</i> sp.	32
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<i>Capitella capitata</i>	32, 53, 69, 74, 75, 76, 77, 88, 89
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<i>Capitomastus aciculatus</i>	76, 77
<i>Carazziella hobsonae</i>	32, 53, 75, 76, 77
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<i>Caulieriella alata</i>	32, 76, 77
<i>Caulieriella killariensis</i>	76
<i>Caulieriella cf. zetlandica</i>	14, 80
<i>Caulieriella</i> sp.	32, 75, 76, 77
<i>Caulieriella</i> sp. C	14, 80
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<i>Ceratonereis irritabilis</i>	32, 76, 77
<i>Ceratonereis longicrrata</i>	76, 77, 89
<i>Ceratonereis mirabilis</i>	69, 74, 75, 76, 77
<i>Chaetopterus variopedatus</i>	89
<i>Chaetozone setosa</i>	75, 76, 77
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<i>Chaetozone</i> sp. B	14, 80
<i>Chaetozone</i> sp. C	14, 80
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<i>Chaetozone</i> sp.	14, 32
<i>Chone americana</i>	14, 53, 80, 89
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<i>Cirriformia grandis</i>	75, 76, 77, 80
<i>Cirriformia</i> sp. A	69, 74, 85, 76, 80
<i>Cirriformia</i> sp. A	77, 89
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<i>Cirrophorus lyra</i>	14, 80, 99
<i>Cirrophorus</i> sp.	14, 32, 80
<i>Cistenides gouldii</i>	69, 74, 75, 76, 77
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<i>Cossura</i> sp.	11, 14, 80
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<i>Dasybranchus lunatulus</i>	77
<i>Dasybranchus</i> sp.	77
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<i>Decamastis</i> sp. A	14, 80
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<i>Diopatra cuprea</i>	11, 14, 20, 32, 53, 69, 74, 75, 76, 77, 80, 88, 89
<i>Diopatra</i> sp.	32
<i>Dispio uncinata</i>	69, 74, 89
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<i>Dorvillidae undeterminn.</i>	14, 32, 76, 77, 80
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<i>Drilonerries</i> sp.	76, 77
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<i>Enoplobranchus sanguineus</i>	76, 77
<i>Eteone heteropoda</i>	53, 69, 74, 76, 77, 89
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<i>Glycera oxycephala</i>	69, 74, 75, 76, 77
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<i>Haploscolopussrobustus</i>	69, 74, 75, 76, 88
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<i>Laeoneries culveri</i>	11, 53, 69, 74, 75, 76, 77, 88, 89
<i>Laonice cirtata</i>	32, 74, 77, 88
<i>Langerhansia cornuta</i>	75, 76, 77
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<i>Lumbrineris tetraura</i>	75, 76, 77
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<i>Lumbrineris</i> sp.	14, 32, 77, 89
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<i>Magelona longicornis</i>	75, 76, 77
<i>Magelona pettiboneae</i>	69, 74, 75, 76, 77
<i>Magelona</i> sp.	32, 76, 77
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<i>Mastobranchus variabilis</i>	77
<i>Mastobranchus</i> sp.	14, 76, 77, 80
<i>Mediomastus ambiseta</i>	14, 32, 76, 77, 92
<i>Mediomastus californiensis</i>	14, 69, 74, 75, 76, 77, 89
<i>Mediomastus</i> sp.	14, 32, 53, 77, 88, 99
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<i>Megalomma lobiferum</i>	77
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<i>Onuphis simoni</i>	75, 76, 77
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<i>Parapriionosyllis</i> sp. A	69, 74, 75, 76
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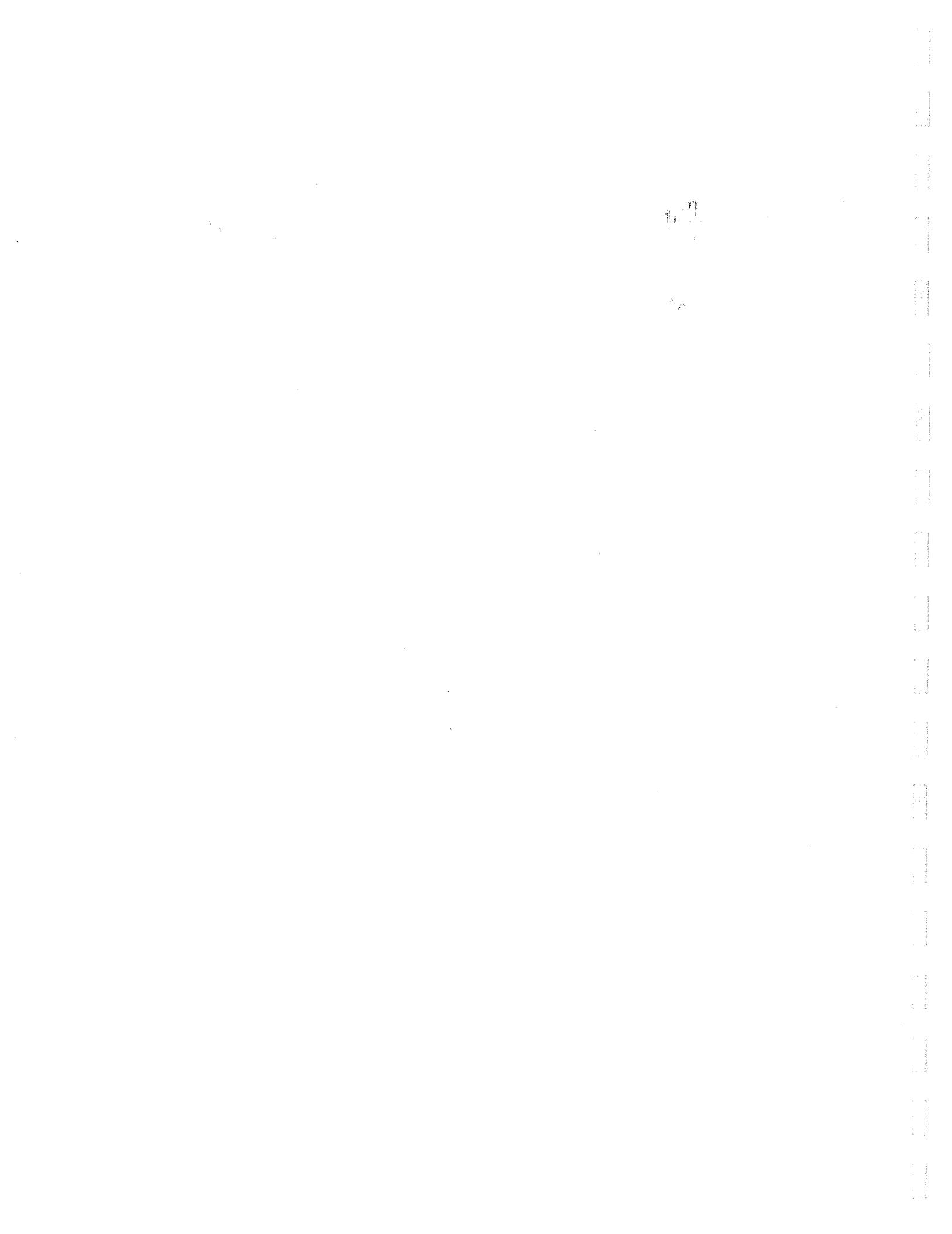
<i>Podarkeopsis levifuscina</i>	32, 53, 99
<i>Poecilochaetus johnsoni</i>	69, 74, 75, 76, 77
<i>Poecilochaetus</i> sp.	32
<i>Polycirrus carolinensis</i>	76, 77
<i>Polycirrus eximus</i>	69, 74, 76, 77
<i>Polycirrus</i> sp.	77
<i>Polydora aggregata</i>	75, 76, 77
<i>Polydora anomolata</i>	76, 77
<i>Polydora caulleryi</i>	14, 80
<i>Polydora colonia</i>	76
<i>Polydora commensalis</i>	76, 77
<i>Polydora cornuta</i>	32
<i>Polydora hamata</i>	69, 74, 75, 76
<i>Polydora ligni</i>	14, 53, 69, 74, 75, 76, 77, 80, 88, 89
<i>Polydora socialis</i>	32, 53, 75, 76, 77
<i>Polydora websteri</i>	53, 69, 74, 75, 76, 77, 88, 89
<i>Polydora</i> sp.	14, 32, 76, 77, 80
<i>Polygordius</i> sp.	32, 75, 76, 77
<i>Polynoidae undetermn.</i>	14, 32, 76, 77, 80
<i>Pomatoceros americanus</i>	77
<i>Pomatoceros</i> sp.	76, 77
<i>Potamilla reniformis</i>	76, 77, 89
<i>Praxillella</i> sp.	77
<i>Prionospio cirrifera</i>	14, 32, 80
<i>Prionospio cristata</i>	14, 32, 53, 75, 76, 77, 80, 89, 92, 99
<i>Prionospio dayo</i>	14, 76, 77, 80
<i>Prionospio fallax</i>	14, 80, 89
<i>Prionospio heterobranchia</i>	14, 32, 53, 74, 75, 76, 77, 80, 89, 92, 99
<i>Prionospio perkosi</i>	53
<i>Prionospio pumaea</i>	14, 80
<i>Prionospio steenstrupi</i>	14, 69, 74, 80
<i>Prionospio</i> sp.	32, 53, 76, 77, 80
<i>Prionosyllis</i> sp.	89
<i>Protocirrus macroceros</i>	76
<i>Protodorvillea kefersteini</i>	75, 76, 77
<i>Protodrilus</i> sp. A	76
<i>Pseudoeurythoe ambigua</i>	69, 74, 75, 76, 77
<i>Rullierinereis mexicana</i>	75, 76, 77
<i>Rullierinereis</i> sp. A	32
<i>Rullierineries</i> sp.	14
<i>Sabaco americanus</i>	99
<i>Sabella microphthalma</i>	11, 74, 75, 76, 77, 80
<i>Sabellaria floridensis</i>	32, 69
<i>Sabellaria vulgaris</i>	76, 77
<i>Sabellaridae</i>	32
<i>Sabellidae</i>	32
<i>Sabellides oculata</i>	88
<i>Schistomeringos pectinata</i>	32
<i>Schistomeringos rudophi</i>	32, 53, 69, 74, 75, 76, 77
<i>Schistomeringos</i> sp.	32
<i>Scolelepis squamata</i>	69, 74, 76, 77, 89

<i>Scololepis texana</i>	32, 69, 74, 75, 76, 77, 89, 92
<i>Scololepis</i> sp.	75, 76, 77
<i>Scoletoma verrilli</i>	92, 99
<i>Scoloplos armiger</i>	75, 76, 77
<i>Scoloplos</i> cf. <i>capensis</i>	74
<i>Scoloplos rubra</i>	14, 32, 53, 69, 74, 75, 76, 77, 80
<i>Scoloplos texana</i>	32, 69
<i>Scoloplos</i> sp.	32, 76, 77
<i>Scyphoprocus platypocetus</i>	69, 74, 75, 76, 77
<i>Sigalion</i> sp.	89
<i>Sigalionidae</i>	32
<i>Sigambla bassi</i>	14, 32, 53, 69, 74, 75, 76, 77, 80, 89
<i>Sigambla tentaculata</i>	14, 32, 53, 75, 77, 80, 89, 92, 99
<i>Sphaerosyllis labyrinthophylis</i>	77
<i>Sphaerosyllis piriferopsis</i>	3
<i>Sphaerosyllis riseri</i>	76
<i>Sphaerosyllis taylori</i>	32, 53, 77
<i>Sphaerosyllis</i> sp. A	75, 76, 77
<i>Sphaerosyllis</i> sp. F	32
<i>Spiro filicornis</i>	69, 74
<i>Spiro pettiboneae</i>	32, 75, 76, 77, 80, 99
<i>Spiro setosa</i>	75, 76, 77
<i>Spiochaetopterus costarum</i>	14, 80
<i>Spiochaetopterus oculatus</i>	32, 53, 69, 74, 75, 76, 77, 92, 99
<i>Spionidae undetmn.</i>	32, 77
<i>Spiophanes bombyx</i>	14, 32, 53, 69, 74, 75, 76, 77, 80, 88, 89, 99
<i>Spiophanes wigleyi</i>	89
<i>Spiophanes</i> sp.	14, 32, 80
<i>Spirorbis spirillum</i>	69, 74
<i>Spirorbis corrugatus</i>	92
<i>Spirorbis</i> sp.	20, 75, 76, 77, 89
<i>Sthenelais boa</i>	69, 74, 75, 76, 77, 89
<i>Sthenelais limicola</i>	76, 77
<i>Sthenelais</i> sp. A	14, 32, 53, 80
<i>Sthenelais</i> sp. G	32
<i>Sthenelais</i> sp.	14
<i>Streblosoma hartmanae</i>	20, 69, 74, 75, 76, 77
<i>Streblosoma verrilli</i>	89
<i>Streblospio benedicti</i>	14, 32, 53, 69, 74, 76, 77, 80, 88, 89, 92
<i>Streblospio pettiboneae</i>	53, 76, 77, 99
<i>Streptosyllis</i> sp. B	32
<i>Subadyte pellucida</i>	76
<i>Syllidae undetmn.</i>	32, 75, 76, 77
<i>Syllides floridanus</i>	32
<i>Syllides verrilli</i>	76, 77
<i>Syllides</i> sp. A	75, 76
<i>Syllis cornuta</i>	69, 74, 99
<i>Syllis gracilis</i>	32, 75, 76, 77
<i>Syllis spongicola</i>	75, 76, 77
<i>Syllis</i> sp.	11, 89
<i>Synelmis albini</i>	75, 76, 77

<i>Synelmis ewingi</i>	32
Terebellidae undetermined.	14, 32, 75, 76, 77, 80
<i>Terebellides stroemi</i>	69, 74, 76, 77
<i>Terebellides</i> sp. A	32
<i>Tharyx annulatus</i>	32
<i>Tharyx cf. annulosus</i>	11, 14, 80, 89
<i>Tharyx dorsobranchialis</i>	53, 77
<i>Tharyx kirkegaardi</i>	99
<i>Tharyx</i> sp. A	69, 74, 75, 76, 77
<i>Tharyx</i> sp. B	75, 76
<i>Tharyx</i> sp.	14, 53, 76, 77, 80
<i>Thelepus setosus</i>	77
<i>Travisia hobsonae</i>	32, 69, 74, 75, 76, 77, 89
Trichobranchidae	32
<i>Trichobranchus glacialis</i>	75, 76, 77
<i>Tripanosyllis vittigera</i>	89
<i>Thalassodrilides belli</i>	53
<i>Tubificoides browniae</i>	53
<i>Tubificoides waselli</i>	53
<i>Typosyllis lutea</i>	32
<i>Typosyllus</i> sp.	75, 76, 77

Appendix 8

Mollusca Reported from the St. Andrew Bay Estuary



Mollusca	Genus and Species	Common Name	Reference
	<i>Abra aequalis</i>	Atlantic abra	14, 32, 75, 76, 77, 80, 99
	<i>Acanthochitona pygmaea</i>	Striated glass-hair chiton	74, 89
	<i>Acanthopleura</i> sp. A		9, 74, 75, 76, 77
	<i>Aclis</i> sp.		32
	<i>Acteocina bidentata</i>	Two-toothed barrel-bubble	32
	<i>Acteocina caniculata</i>	Channeled barrel-bubble	32, 52, 53, 69, 74, 75, 76, 77, 99
	<i>Acteon punctostriatus</i>	Pitted baby-bubble	32, 52, 53, 69, 74, 76, 77
	<i>Alvania</i> sp. H		32
	<i>Amygdalum papyrium</i>	Atlantic Paper mussel	32, 52, 53, 76, 77, 88, 89
	<i>Anachis avara</i>	Greedy dovesnail	91
	<i>Anachis floridana</i>	Florida dovesnail	69, 74, 75, 76, 77
	<i>Anachis obesa</i>	Fat dovesnail	14, 32, 53, 76, 77, 80, 99
	<i>Anachis translirata</i>		89
	<i>Anachis transversa</i>		76, 77
	<i>Anachis</i> sp. A		75, 76, 77
	<i>Anadara floridana</i>	Cut-ribbed ark	60, 74, 75, 76, 77
	<i>Anadara imbricata</i>		76
	<i>Anadara transversa</i>	Transverse ark	52, 69, 74, 75, 76, 77, 89
	<i>Anadara</i> sp.		74, 77
	<i>Anatina</i> sp. A		76
	<i>Anodontia alba</i>	Buttercup lucine	69, 74, 75, 76, 77, 89
	<i>Anomalocardia auberiana</i>	Pointed venus	32, 53, 69, 74, 76, 77, 99
	<i>Anomalocardia cuneimeris</i>		89
	<i>Anomia simplex</i>	Common Jingle	32, 74, 75, 76, 77, 91
	<i>Anomia</i> sp.		74
	<i>Antillophos candei</i>	Beaded phos	76
	<i>Aplysia brasiliiana</i>		111
	<i>Arca imbricata</i>	Mossy ark	84, 91
	<i>Arca transversa</i>		74
	<i>Arca zebra</i>	Turkey wing	84, 91
	<i>Arcopsis adamsi</i>	Adam's ark	14, 32, 80
	<i>Arcanella cornuta</i>	Florida spiny jewel box	91
	<i>Arene tricarinata</i>	Gem cyclostreme	75, 76, 77
	<i>Argopecten gibbus</i>	Atlantic calico scallop	32, 76, 77
	<i>Argopecten irradians concentricus</i>	Bay Scallop	14, 65, 69, 74, 75, 76, 77, 80, 89, 91
	<i>Argopecten</i> sp.		53
	<i>Asaphis deflorata</i>	Gaudy sanguin	14, 80
	<i>Atrina rigida</i>	Stiff penshell	77, 91
	<i>Atrina seminuda</i>	Half-naked penshell	76, 77
	<i>Atrina serrata</i>	Sawtooth penshell	77
	<i>Bankia gouldi</i>	Gould shipworm	76
	<i>Bankia</i> sp.		89
	<i>Barbatia candida</i>	White beard ark	32, 53
	<i>Batillaria minima</i>		50
	<i>Bittium varium</i>	Gross cerith	89, 92
	<i>Brachiodontes exustus</i>	Scorched mussel	32, 52, 69, 74, 75, 76, 77
	<i>Brachiodontes recurvis</i>		74, 88, 89
	<i>Bulla striata</i>	Striate bubble	32, 52, 69, 74, 75, 76, 77, 89, 91
	<i>Bullata ovuliformis</i>		77
	<i>Bushia</i> sp. A		32

<i>Busycon contrarium</i>	Lightening whelk	89, 91
<i>Busycon spiratum pyruloides</i>	Pearl welk	91
<i>Caecum bipartitum</i>		14, 80
<i>Caecum cooperi</i>		11, 32, 75, 76, 77, 89, 111
<i>Caecum floridanum</i>	Florida caecum	69, 74, 75, 76, 77
<i>Caecum imbricatum</i>	Imbricate caecum	14, 32, 80
<i>Caecum johnsoni</i>		53, 92, 111
<i>Caecum muscarum</i>		77
<i>Caecum nitidum</i>	Little horn caecum	32, 53, 69, 74, 75, 76, 77
<i>Caecum pulchellum</i>	Beautiful caecum	14, 32, 53, 80, 92, 99
<i>Caecum rysosotum</i>	Minute caecum	14, 80
<i>Caecum strigosum</i>		75, 76, 77
<i>Caecum vestitum</i>	Vera Cruz caecum	14, 80
<i>Caecum</i> sp. A		32, 75, 76
<i>Caecum</i> sp.		32, 77
<i>Callistoma jujubinum</i>	Mottled topsnail	75, 76, 77
<i>Callista eucymata</i>	Glory-of-the-sea venus	14, 80
<i>Cantharus cancellarius</i>	Cancellate cantharus	32
<i>Cantharus multangulus grandanus</i>	Ribbed cantharus	1, 11, 91
<i>Cantharus tinctus</i>	Tinted cantharus	91
<i>Cardiomya costellata</i>	Little-ribbed cardiomya	32, 77
<i>Cardyomia ornatissima</i>	Ornate cardiomya	14, 80
<i>Cardita floridana</i>	Broad-ribbed cardita	91
<i>Carditamera floridana</i>	Broad-ribbed cardita	32, 69, 74, 75, 76, 77
<i>Cassis madagascariensis</i>	Queen helmet	91
<i>Cerithiopsis bicolor</i>		77
<i>Cerithiopsis emersoni</i>		53
<i>Cerithiopsis greeni</i>		52, 76, 77
<i>Cerithium atratum</i>	Dark cerith	91
<i>Cerithium floridanum</i>		89
<i>Cerithium muscarum</i>	Flyspeck cerith	53, 69, 74, 75, 76, 77, 89, 91
<i>Cerithium</i> sp.		74
<i>Chaetopleura apiculata</i>		11, 75, 76, 77
<i>Chama congregata</i>	Corrugate jewelbox	84
<i>Chione cancellata</i>	Cross-barred venus	14, 32, 53, 69, 74, 75, 76, 77, 80, 89, 91, 99
<i>Chione grus</i>	Gray pigmy venus	14, 32, 69, 74, 75, 76, 77, 80
<i>Chione interpurpurea</i>	Lady-in-waiting venus	75, 76, 77
<i>Chione</i> sp.		32, 53, 88
<i>Codakia orbiculata</i>	Dwarf tiger lucine	76, 77
<i>Columbella rusticoides</i>	Rusty dovesnail	91
<i>Conus jaspidus</i>	Jasper cone	91
<i>Conus mus</i>	Mouse cone	69, 74
<i>Corbula barrattiana</i>	Barratt corbula	74
<i>Corbula caribaea</i>		76, 77
<i>Corbula contracta</i>	Contracted corbula	32, 53, 89
<i>Corbula</i> sp. A		75, 76, 77
<i>Corbula</i> sp.		32
<i>Crassinella lunulata</i>	Lunate crassinella	32, 74, 75, 76, 77
<i>Crassinella mactacea</i>		76, 77
<i>Crassinella martinicensis</i>	Martinique crassinella	69, 74, 75, 76, 77
<i>Crassinella</i> sp.		77

<i>Crassispira leucocyma</i>	White-knobbed drillia	69, 74, 75, 76, 77, 91
<i>Crassispira</i> sp.		76, 77, 89
<i>Crassostrea virginica</i>	Eastern oyster	26, 27, 28, 50, 65, 75, 76, 77, 89, 91
<i>Crepidula aculeata</i>	Spiny slippersnail	91
<i>Crepidula fornicata</i>	Common Atlantic slippersnail	11, 69, 74, 75, 76, 77, 80, 89, 91
<i>Crepidula maculosa</i>	Spotted slippersnail	11, 14, 32, 52, 53, 69, 74, 75, 76, 77, 80, 89, 91
<i>Crepidula plana</i>	Eastern white slippersnail	32, 52, 53, 75, 76, 77, 91
<i>Crepidula</i> sp.		32, 53, 75, 76, 77
<i>Cumingia tellinoides</i>	Tellin semele	75, 76, 77
<i>Cuspidaria</i> sp.		76, 77
<i>Cuspidaridae</i>		32
<i>Cyclinella tenuis</i>	Thin cyclinella	14, 75, 76, 77, 80, 89
<i>Cyclostremiscus pentagonus</i>		14, 32, 80
<i>Cylichna bidentata</i>		88, 89
<i>Cylichnella bidentata</i>		14, 75, 76, 77, 80
<i>Cymatium cingulatum</i>	Poulsen's triton	91
<i>Cymatium parthenopeum</i>	Giant hairy triton	91
<i>Cypraea cervus</i>	Atlantic deer cowrie	91
<i>Dentalium callipeplum</i>		14, 80
<i>Dentalium eboreum</i>		32, 75, 76, 77
<i>Dentalium texasanum</i>		32
<i>Dentalium</i> sp. A		75, 76, 77
<i>Dentalium</i> sp. C		32
<i>Dentalium</i> sp.		32
<i>Diastoma varium</i>		14, 32, 52, 53, 69, 74, 75, 76, 77, 80
<i>Diastoma</i> sp.		76
<i>Dinocardium robustum</i>	Atlantic giant cockle	76, 77, 91
<i>Diplodonta punctata</i>	Atlantic dipodon	14, 75, 76, 77, 80, 89
<i>Donax texasanus</i>	Texas coquina	69, 74
<i>Donax variabilis</i>	Variable coquina	89
<i>Dosinia discus</i>	Disk dosinia	32, 77
<i>Dosinia elegans</i>	Elegant dosinia	32
<i>Dosinia</i> sp.		32, 76, 77
<i>Ensis minor</i>	Minor jackknife	32, 53, 69, 74, 75, 76, 77, 89
<i>Episcynia inornata</i>	Hairy vitrinella	32
<i>Epitonium angulatum</i>	Angulate wentletrap	91
<i>Epitonium multistriatum</i>	Many-ribbed wentletrap	32
<i>Epitonium rupicola</i>	Frosted wentletrap	52, 69, 74, 91
<i>Epitonium</i> sp.		32, 53
<i>Ervilia concentrica</i>	Concentric ervilis	32, 69, 74, 75, 76, 77, 92, 111
<i>Eulima</i> sp. A		75, 76
<i>Eulima</i> sp. B		75, 76
<i>Eulima</i> sp.		77
<i>Eulimastoma eulimastoma teres</i>		53
<i>Eupleura silcidentata</i>	Sharp-rib drill	32, 74, 76, 77, 91
<i>Fasciolaria lilium hunteri</i>	Banded tulip	69, 74, 75, 76, 77, 91
<i>Fasciolaria tulipa</i>	True tulip	69, 74, 75, 76, 77, 84, 89, 91
<i>Favartia cellulosa</i>	Pitted murex	75, 76, 77
<i>Ficus communis</i>	Atlantic fighsnail	91
<i>Finella dubia</i>		32
<i>Ganesa</i> sp. B		32

<i>Gastrochaena hians</i>	Atlantic rocellaria	32
<i>Gastrosaccus dissimilis</i>		74
<i>Geukensia demissa</i>	Ribbed mussel	76
<i>Glycemaris americana</i>	Giant bittersweet	74, 89
<i>Gouldia cerina</i>	Waxy gould clam	75, 76, 77
<i>Granulaina ovaliformis</i>	Teardrop marginella	50, 53, 69, 74, 75, 76, 77
<i>Haminoea succinea</i>	Amber glassy-bubble	32, 53, 76, 77, 89
<i>Haminoea</i> sp. A		76
<i>Haminoea</i> sp. B		76
<i>Haminoea</i> sp.		77
<i>Here sombrerensis</i>		14, 80
<i>Hyalina avenacea</i>		69, 74, 75, 76, 77
<i>Hyalina veliei</i>	Velie's marginella	75, 76, 77, 91
<i>Hyalina</i> sp.		76, 77
<i>Ischnochiton papillosum</i>		75, 76, 77
<i>Ischnochiton</i> sp. A		32
<i>Kurtziella diomedea</i>		69, 74
<i>Kurtziella limonitella</i>	Punctate mangelia	75, 76, 77
<i>Kurtziella</i> sp.		74, 75, 76, 77
<i>Laevicardium mortoni</i>	Morton eggcockle	32, 53, 69, 74, 75, 76, 77, 80, 89, 91, 99
<i>Laevicardium pictum</i>	Painted eggcockle	32, 69, 74, 75, 76, 77
<i>Laevicardium</i> sp.		75, 76, 77
<i>Lepton</i> sp. A		69, 74, 75, 76
<i>Lepton</i> sp.		77
<i>Lima pellucida</i>	Antillean fileclam	32, 84
<i>Lioberus castaneus</i>	Chestnut mussel	11, 88
<i>Lithophaga bisulcata</i>	Mahogany datemusse	75, 76, 77
<i>Lithophaga</i> sp.		89
<i>Littoridinops monroensis</i>		100
<i>Littoridinops palustris</i>		100
<i>Littorina irrrotata</i>	Marsh periwinkle	88, 91
<i>Littorina zizac</i>	Zebra periwinkle	22, 91
<i>Loligo</i> sp.		111
<i>Loliguncula brevis</i>	Atlantic brief squid	50, 65
<i>Lucina florida</i>		89
<i>Lucina multilineata</i>		32, 111
<i>Lucina nassula</i>	Woven lucine	32, 76, 77
<i>Lucina</i> sp.		75, 76, 77
<i>Lyonsia floridana</i>	Florida lyonsia	89
<i>Lyonsia hyalina floridana</i>	Glossy lyonsia	14, 32, 52, 53, 69, 74, 75, 76, 77, 80, 99
<i>Macoma constricta</i>	Constricted macoma	53, 69, 74, 75, 76, 77
<i>Macoma tenta</i>	Elongate macoma	32, 75, 76, 77
<i>Macoma</i> sp.		32, 75, 76, 77
<i>Macrocallista maculata</i>	Calico clam	32, 77
<i>Macrocallista mnimbosa</i>	Sunray venus	89
<i>Macromphalina palmalitoris</i>	Palm Beach macromphaline	32
<i>Mactra fragilis</i>	Fragile surf clam	32, 69, 74, 75, 76, 77
<i>Mangelia cf. quadrata</i>		32
<i>Mangelia</i> sp. A		75, 76, 77
<i>Marginella apicina</i>	Common Atlantic marginella	14, 32, 69, 74, 75, 76, 77, 80
<i>Marginella aureocincta</i>		32, 69, 74, 75, 76, 77

<i>Marginella eburneola</i>		69, 74, 75, 76, 77
<i>Marginella lavalleeana</i>	Snowflake marginella	32, 75, 76, 77
<i>Marginella minuta</i>		77
<i>Marginella</i> sp.		76, 77
<i>Marginellidae</i>		32
<i>Martesia</i> sp.		77
<i>Meoserus nitidum</i>		14, 80
<i>Melanella jamaicensis</i>	Jamaica eulima	69, 74
<i>Melongena corona</i>	Crown conch	53, 69, 74, 89, 91
<i>Mercenaria campechiensis</i>	Southern quahog	69, 74, 76, 77, 91
<i>Mercenaria mercenaria</i>	Northern quahog	91
<i>Mercenaria</i> sp.		53, 65
<i>Mitra</i> sp.		89
<i>Mitrella lunatata</i>	Lunar dovesnail	32, 52, 53, 69, 74, 75, 76, 77, 89
<i>Modiolus americanus</i>	American horse mussel	69, 74, 75, 76, 77
<i>Modiolus demissus</i>		88, 89
<i>Modiolus modiolus</i>	Northern Horse mussel	52
<i>Modulus modulus</i>	Buttonsnail	69, 74, 75, 76, 77, 91
<i>Monilispira leucocyma</i>		14, 80, 89
<i>Montacuta</i> sp.		76, 77
<i>Mulina lateralis</i>	Dwarf surfclam	14, 32, 53, 75, 76, 77, 80, 99
<i>Murex pomum</i>	Apple murex	91
<i>Murex fulvescens</i>	Giant Atlantic murex	91
<i>Murex dilechus florifer</i>	Lace murex	91
<i>Musculus lateralis</i>	Lateral mussel	32, 53, 74, 75, 76, 77
<i>Mysella planulata</i>	Plate mysella	32, 53, 75, 76, 77, 99
<i>Mysella</i> sp.		77
<i>Mytrea lens</i>	Lens lucine	14, 80
<i>Nassarius acutus</i>	Sharp nassa	14, 32, 53, 80, 91, 99
<i>Nassarius albus</i>	White nassa	52, 84, 91
<i>Nassarius consensus</i>	Striate nassa	75, 76, 77
<i>Nassarius vibex</i>	Bruised nassa	11, 32, 52, 53, 69, 74, 75, 76, 77, 88, 89, 91
<i>Natica pusilla</i>		14, 32, 75, 76, 77, 80
<i>Neaeromya floridana</i>		14, 80
<i>Neosimnia uniplicata</i>	Single-toothed simnia	91
<i>Neritina reclivata</i>	Virgin nerite	53, 75, 76, 77, 88
<i>Neritina usnea</i>		100
<i>Neverita duplicata</i>		99
<i>Niso</i> sp.		75, 76, 77
<i>Nucula</i> sp. A		32
<i>Nuculana acuta</i>	Pointed nutclam	14, 32, 75, 76, 77, 80, 99
<i>Nuculana concentrica</i>	Concentric nutclam	32, 89, 111
<i>Nuculana</i> sp.		32
<i>Nudibranchia</i> sp. A		89
<i>Nudibranchia</i> sp. 1		53
<i>Nudibranchia</i> sp. 2		53
<i>Nudibranchia</i> sp. 3		53
<i>Nudibranchia</i> undetermin.		32, 74, 75, 76, 77
<i>Odostomia acutideus</i>		75, 76, 77
<i>Odostomia bidentata</i>		77
<i>Odostomia bisuturalis</i>		75, 76, 77

<i>Odostomia caniculata</i>		14, 80
<i>Odostomia conidea</i>		14, 80
<i>Odostomia hendersoni</i>		88
<i>Odostomia impressa</i>		52, 53, 76, 77
<i>Odostomia producta</i>		76, 77
<i>Odostomia seminuda</i>		76, 77
<i>Odostomia weberi</i>		32, 92
<i>Odostomia</i> sp.		32, 53, 76, 77, 89
<i>Odostomia</i> sp. A		75, 76
<i>Odostomia</i> sp. B		75, 76
<i>Odostomia</i> sp. E		32
<i>Oliva sayana</i>	Lettered olive	14, 32, 69, 74, 80, 91
<i>Olivella dealbata</i>	Whitened dwarf olive	32, 99
<i>Olivella floralia</i>	Rice olive	76, 77
<i>Olivella floridana</i>		76, 77
<i>Olivella minuta</i>	Minute dwarf olive	14, 69, 74, 75, 76, 77, 80
<i>Olivella mutica</i>	Variable dwarf olive	75, 76, 77, 89, 91
<i>Olivella perplexa</i>		14, 80
<i>Olivella pusilla</i>	Tiny dwarf olive	69, 75, 75, 76, 77, 91
<i>Olivella</i> sp. A		75, 76, 77
<i>Olivella</i> sp. E		32
<i>Olivella</i> sp. K		32
<i>Olivella</i> sp.		32
<i>Omalogyra</i> sp. D		32
<i>Onobops jacksoni</i>		100
<i>Ostrea equestris</i>	Crested gemclam	75, 76, 77, 89
<i>Ostrea frons</i>	Coon oyster	91
<i>Parastarte triquestra</i>	Brown gemclam	32, 53, 69, 74, 75, 76, 77, 89
<i>Parvilucina amiantus</i>		14
<i>Parvilucina multilineata</i>	Many-line lucine	14, 69, 74, 75, 76, 77, 80, 99
<i>Periploma margaritaceum</i>		99
<i>Persicula lavalleeana</i>		76, 77
<i>Pinctata imbricata</i>	Atlantic pearl-oyster	84
<i>Pitar fulminatus</i>	Lightening pitar	32, 99
<i>Pitar simpsoni</i>	Simpson pitar	77
<i>Pitar</i> sp. A		75, 76, 89
<i>Pitar</i> sp.		76, 77
<i>Pleuroploca gigantea</i>	Horse conch	77, 91
<i>Plicatula gibbosa</i>	Atlantic kittenpaw	77
<i>Polinices duplicatus</i>	Atlantic Moon snail	32, 69, 74, 75, 76, 77, 91
<i>Prunum apicinum</i>	Common Atlantic marginella	11, 74, 89, 91
<i>Prunum carneum</i>		89
<i>Prunum marginellum</i>		89
<i>Pseudomiltha floridana</i>	Florida lucine	75, 76, 77
<i>Pteria colymbus</i>	Atlantic wing-oyster	75, 76, 77, 84
<i>Pyramidella crenulata</i>	Crenate pyramidella	32, 69, 74, 75, 76, 77, 91
<i>Pyramidella fusca</i>		11, 88
<i>Pyramidella</i> sp.		74
<i>Pyrgocythara filosa</i>	Filose mangelia	32
<i>Pyrgocythara plicosa</i>	Plicate mangelia	53, 76, 77
<i>Pyrgocythara</i> sp.		75, 76, 77

<i>Pythenella cuneata</i>	Cuneate montacutid	32
<i>Rangia cuneata</i>	Atlantic rangia	65, 88
<i>Retusa canaliculata</i>		89
<i>Retusa</i> sp. 1		88
<i>Rissoina catesbyana</i>		32, 69, 74, 75, 76, 77
<i>Rissoina</i> sp.		32
<i>Sayella fusca</i>		52
<i>Sayella</i> sp.		53, 75, 76, 77
<i>Scyllaea pelagica</i>	Sargassum nudibranch	89
<i>Seila adamsi</i>		74, 77
<i>Semele bellastrata</i>	Cancellate semele	32, 75, 76, 77
<i>Semele nucleoides</i>	nut semele	32, 75, 76, 77, 111
<i>Semele proficua</i>	Atlantic semele	69, 74, 75, 76, 77
<i>Semele</i> sp. A		76
<i>Sigatica</i> sp.		32
<i>Sinum perspectivum</i>	White baby-ear	32
<i>Smaragdia viridis</i>	Emerald nerite	77
<i>Soleriorbis infracarinata</i>		14, 32, 76, 77, 80
<i>Solemya velum</i>	Atlantic awingclam	32, 77
<i>Solemya</i> sp. A		76
<i>Solen viridis</i>	Green jackknife	32, 52, 88, 89
<i>Strigilla mirabilis</i>	White strigilla	69, 74, 75, 76, 77
<i>Strombiformis auricinctus</i>	Gold-stripe eulima	32
<i>Strombiformis hemphilli</i>		32
<i>Strombus alatus</i>	Florida fighting conch	14, 80, 91
<i>Strombus costatus</i>	Milk conch	84
<i>Tagelus divisus</i>	Purple tagelus	14, 32, 75, 76, 77, 80, 99
<i>Tagelus plebeius</i>	Stout tagelus	32, 52, 53, 69, 74, 75, 67, 77, 88
<i>Tectonatica pusilla</i>	Minature moonsnail	76, 77
<i>Tegula</i> sp.		75
<i>Teinostoma biscayne</i>	Biscayne vitrinella	14, 53, 80
<i>Tellidora cristata</i>	White-crest tellin	32, 77
<i>Tellina aequistrigata</i>	Striate tellin	32
<i>Tellina agilis</i>	Northern dwarf tellin	74, 88
<i>Tellina alternata</i>	Alternate tellin	69, 74, 99
<i>Tellina iris</i>	Rainbow tellin	32, 77
<i>Tellina lineata</i>	Rose-petal tellin	74, 88
<i>Tellina listeri</i>	Speckled tellin	75, 76, 77
<i>Tellina nitens</i>	Shiny dwarf-tellin	69, 74
<i>Tellina radiata</i>	Sunrise tellin	14, 80
<i>Tellina similis</i>	Candystick tellin	14, 80
<i>Tellina squamifera</i>		99
<i>Tellina symbaritica</i>	Sybaritic tellin	88
<i>Tellina tampaensis</i>	Tampa tellin	14, 32, 69, 75, 76, 77, 80, 88
<i>Tellina tayloriana</i>		74, 75, 76, 77
<i>Tellina texana</i>	Say tellin	32, 69, 74, 75, 76, 77, 88, 89, 99
<i>Tellina versicolor</i>	many-colored tellin	14, 32, 69, 74, 75, 76, 77, 80, 89, 111
<i>Tellina</i> sp. A		69, 74, 75, 76
<i>Tellina</i> sp.		14, 32, 77, 80
<i>Terebra dislocata</i>	Eastern auger	14, 32, 80, 91
<i>Terebra</i> sp. A		69, 74, 75, 76

<i>Terebra</i> sp. A		32, 77
<i>Texadina barretti</i>		100
<i>Texadina sphinctostoma</i>		100
<i>Thais haemastoma</i>	Florida rocksail	91
<i>Thais haemastoma floridana</i>	Florida rockshell	77
<i>Thracia</i> sp.		75, 76, 77
<i>Tornatina candei</i>		14, 80
<i>Trachycardium egmontium</i>	Florida pricklycockle	91
<i>Trachycardium muraticum</i>	Yellow pricklycockle	14, 32, 69, 74, 75, 76, 77, 80
<i>Trachycardium</i> sp.		74
<i>Transennella</i> sp.		77
<i>Trifora nigrocincta</i>	Black-line triphora	52, 75, 76, 77
<i>Turbo castanea</i>	Chestnut turban	89, 91
<i>Turbanilla conradi</i>		14, 32, 52, 53, 80
<i>Turbanilla hemphilli</i>		14, 32, 80, 89
<i>Turbanilla interrupta</i>		32
<i>Turbanilla portaricana</i>		14, 80
<i>Turbanilla</i> sp. F		32
<i>Turbanilla</i> sp. G		32
<i>Turbanilla</i> sp.		75, 76, 77
Turridae undetmn.		32, 77
<i>Urosalpinx cinerea</i>	Atlantic oyster drill	14, 76, 80, 91
<i>Urosalpinx perrugata</i>		14, 76, 77, 80, 89
Veneridae undetmn.		32, 75, 76, 77
<i>Vexillum</i> sp.		76
<i>Vitrinella helicoidea</i>	Helix vitronella	77
<i>Vitrinella</i> sp.		75, 76, 77
<i>Volvulella persimilis</i>	Southern spindle-bubble	32

Appendix 9

Arthropoda Reported from the St. Andrew Bay Estuary



Arthropoda

Genus and Species	References
<i>Aedes sollicitans</i>	**
<i>Aedes taeniorhynchus</i>	**
<i>Ambidexter symmetricus</i>	32, 105
<i>Acanthohaustorius cf. intermedius</i>	74, 92
<i>Acanthohaustorius cf. millsii</i>	89
<i>Acanthohaustorius uncinus</i>	21, 32, 69, 74, 75, 76
<i>Acanthohaustorius</i> sp. B	76, 77
<i>Acanthohaustorius</i> sp. B	32
<i>Acanthonotozomatid</i> sp. A	77
<i>Acanthosquilla biminenis</i>	98
Acarina	32
<i>Acetes americanum</i>	76, 77
<i>Actinothereis exanthernata</i>	82
<i>Actinothereis subquadrata</i>	82
<i>Acuminodeutopus naglei</i>	32, 75, 76, 77, 92, 99
<i>Acuminodeutopus</i> sp.	32
<i>Acuticythereis loevissima</i>	82
<i>Aeterocrypta granulata</i>	74
<i>Albunea paretii</i>	98
<i>Albunea</i> sp.	98
<i>Almyramacuma proximoculae</i>	98
<i>Alpheopsis trispinosus</i>	32
<i>Alpheus armillatus</i>	69, 74, 75, 76, 77, 98
<i>Alpheus estuariensis</i>	32
<i>Alpheus formosus</i>	76, 77
<i>Alpheus heterochaelis</i>	50, 53, 77, 88, 89
<i>Alpheus normanni</i>	69, 75, 76, 77, 105
<i>Alpheus</i> sp. B	32
<i>Alpheus</i> sp.	32, 74, 75, 77
<i>Amakusanthura magnifica</i>	32
<i>Amakusanthura signata</i>	32
<i>Amakusanthura</i> sp.	32
<i>Ambidexter symmetricus</i>	75, 76, 77
<i>Americhelidium americanum</i>	98
<i>Americhcorchestia heardi</i>	98
<i>Americorchestia salomani</i>	6
<i>Ampelisca abdita</i>	11, 74, 89, 92
<i>Ampelisca</i> agassizi	32, 53
<i>Ampelisca bicarinata</i>	32, 77
<i>Ampelisca cristata microdentata</i>	99
<i>Ampelisca holmesi</i>	53, 75, 76, 77
<i>Ampelisca vadorum</i>	14, 53, 69, 74, 75, 76, 77, 80, 89
<i>Ampelisca verrilli</i>	14, 74, 80, 88, 89
<i>Ampelisca</i> sp. A	32, 69, 74, 75, 77
<i>Ampelisca</i> sp. B	69, 74, 75
<i>Ampelisca</i> sp. C	32, 75, 76, 77
<i>Ampelisca</i> sp. D	77
<i>Ampelisca</i> sp. G	32
<i>Ampelisca</i> sp. N	32

<i>Ampelisca</i> sp. S	32
<i>Ampelisca</i> sp. T	32
<i>Ampelisca</i> sp.	77
<i>Ameroculodes miltoni</i>	98
<i>Amphilocus abditus</i>	80
<i>Amphilocus casahoya</i>	14, 80
<i>Amphilocus neopolitanus</i>	32
<i>Amphilocus</i> sp. A	75, 76, 77
<i>Amphilocus</i> sp.	32
<i>Amphiporeia</i> sp.	89
<i>Ampithoe longimana</i>	32, 76, 77
<i>Ampithoe valida</i>	32, 76, 77
<i>Amphithoe</i> sp. A	75, 77
<i>Amphithoe</i> sp.	32
<i>Ancinus depressus</i>	98
<i>Anilocera laticauda</i>	98
<i>Anilocera</i> sp.	98
<i>Anoplodactylus</i> sp. A	75, 76, 77
<i>Apanthura magnifica</i>	14, 69, 74, 75, 76, 77, 89
<i>Apanthura signata</i>	75, 76, 77
<i>Apocorophium baconi</i>	98
<i>Apocorophium tuberculatum</i>	98
<i>Aporobopyrus curvatus</i>	98
<i>Apseudes propinquus</i>	75, 76, 77
<i>Apseudes</i> sp. A	77
<i>Apsuedes</i> sp. H	32
<i>Arenaeus cribararius</i> (= <i>Sesarma</i>)	98
<i>Argissa hamatipes</i>	32
<i>Argulus</i> sp.	98
<i>Armases cinereum</i>	98
<i>Arrenurus</i> sp.	32
<i>Asellata</i> sp.	74
<i>Asterope elliptica</i>	82
<i>Asterope mariae</i>	82
<i>Asteropella agassizii</i>	99
<i>Asteropella maclaughlinae</i>	32
<i>Asteropella pax</i>	32
<i>Asteropella</i> sp. A	32
<i>Asteropterygion oculitristis</i>	32
<i>Aurila conradi</i>	82
<i>Automate evermanni</i>	75, 76, 77
<i>Automate</i> sp.	32
<i>Bagatus</i> sp. I	88
<i>Balanus amphirite</i>	76, 83, 89
<i>Balanus calidrus</i>	98
<i>Balanus eburneus</i>	76, 77, 83, 88, 89
<i>Balanus galeatus</i>	83
<i>Balanus improvisus</i>	74, 75, 76, 77, 83
<i>Balanus subalbidus</i>	100
<i>Balanus venustus</i>	53, 83
<i>Balanus</i> sp.	74

<i>Batea catherinensis</i>	32, 53, 76, 77
<i>Batea</i> sp. A	75
<i>Batea</i> sp. 1	88
<cf>. <i>Batea</i> sp.</cf>	74
<i>Biffarius biformis</i>	98
<i>Bigelowina biminiensis</i>	98
<i>Bopyrella</i> sp. A	77
<i>Bopyrina abbreviata</i>	75, 76, 77
<i>Bopyrina wolffi</i>	98
<i>Bopyrina</i> sp. A	76
<i>Bourletiella spinata</i>	32
<i>Bowmaniella brasiliensis</i>	32, 53, 76, 77
<i>Bowmaniella dissimilis</i>	98
<i>Bowmaniella floridae</i>	53, 76, 77, 89
<i>Bowmaniella</i> sp. A	69, 74, 75
<i>Bythocypris laeva</i>	82
<i>Bythocypris</i> sp.	82
<i>Calanopsis americana</i>	98
<i>Calappa flammea</i>	98
<i>Calcinus tibicen</i>	98
<i>Callianassa biformis</i>	76, 77
<i>Callianassa</i> sp. A	69, 74, 75
<i>Callichirus islagrande</i>	98
<i>Callichirus major</i>	98
<i>Callinectes sapidus</i>	50, 53, 65, 74, 75, 76, 77, 88, 89, 105, 111
<i>Callinectes similis</i>	69, 74, 77
<i>Callinectes</i> sp. A	69, 74, 75
<i>Callinectes</i> sp.	32
<i>Calozodion wadei</i>	77
<i>Campylocythere concinnoidea</i>	82
<i>Campylocythere laeva</i>	82
<i>Candonia</i> sp.	82
<i>Capella equilibra</i>	76
<i>Caprella scaura</i>	98
<i>Caprella</i> sp. A	75, 76, 89
<i>Caprella</i> sp.	11, 20
<i>Caprellidae undetermin.</i>	32, 76, 77
<i>Carpias bermudensis</i>	98
<cf>. <i>Cassidinidea</i> sp.</cf>	88
<i>Carinobatea</i> sp.	32
<i>Ceradocus</i> sp. A	32
<i>Ceradocus</i> sp.	32
<i>Cerapus tubularis</i>	32, 69, 74, 75, 76, 89
<i>Cerapus</i> sp. A	69, 74, 77
<i>Cerapus</i> sp. E	32
<i>Ceratopogonidae</i>	32
<i>Chelorchestia forceps</i>	108
<i>Chirodotea excavata</i>	98
<i>Chthalamus fragilis</i>	22, 83
<i>Chthalamus stellatus</i>	83
<i>Chrysops selatus</i>	**

<i>Chrysops sp.</i>	**
<i>Cirolana parva</i>	98
<i>Cirripedia</i> 1	14, 80
Cladocera 1	14, 80
<i>Clausidium demissa</i>	98
<i>Cleantoides planicauda</i>	75, 76, 77
<i>Cleantis planicauda</i>	69, 74, 89, 105
<i>Clibanarius vittatus</i>	14, 53, 74, 80, 89
<i>Colomastix halichondrae</i>	98
<i>Colomastix janiceae</i>	98
<i>Colomastix</i> sp. A	77
<i>Conchoderma virgatum</i>	83
Copepod 1	14, 80
Copepod 2	14, 80
Copepod 3	14, 80
Copepod 4	14, 80
Copepod 5	14, 80
Copepod 6	80
Copepod 7	14, 80
<i>Coronis scolopendra</i>	98
<i>Corophium acherusicum</i> (= <i>Amphocorophium</i>)	32, 69, 74, 76, 77, 98
<i>Corophium lacustre</i> (= <i>Amphocorophium</i>)	53, 98
<i>Corophium cf. louisianum</i> (= <i>Amphocorophium</i>)	89, 98
<i>Corophium simile</i> (= <i>Amphocorophium</i>)	75, 76, 77
<i>Corophium</i> (= <i>Amphocorophium</i>) sp. A	69, 74, 75, 76, 77
<i>Corophium</i> (= <i>Amphocorophium</i>) sp. G	32
<i>Corophium</i> (= <i>Amphocorophium</i>) sp. O	32
<i>Corophium</i> (= <i>Amphocorophium</i>) sp. Q	32
<i>Corophium</i> (= <i>Amphocorophium</i>) sp.	22, 32, 75, 76, 88
<i>Culicoides melleus</i>	**
<i>Culicoides mississippiensis</i>	**
<i>Culicoides</i> sp.	**
<i>Cumella garrityi</i>	32
<i>Cumella</i> sp. A	75, 76, 77
<i>Cushmonidea elongata</i>	82
<i>Cushmonidea seminuda</i>	82
<i>Cyathura burbanki</i>	88, 89
<i>Cyathura polita</i>	74, 89
<i>Cyclapsis pustulata</i>	32, 99
<i>Cyclapsis varians</i>	14, 32, 52, 80, 99
<i>Cyclapsis</i> sp. A	75, 76, 77
<i>Cyclapsis</i> sp. B	75, 67, 77
<i>Cyclapsis</i> sp. C	77
<i>Cyclapsis</i> sp. D	32
<i>Cyclapsis</i> sp. G	53
<i>Cyclapsis</i> sp. N	32
<i>Cyclapsis</i> sp. R	32
<i>Cyclapsis</i> sp. (<i>unironus</i>)	14, 80
<i>Cymadusa compta</i>	11, 14, 32, 53, 69, 74, 75, 76, 77, 88, 89, 92
<i>Cymadusa faxoni</i>	53, 75, 76, 77
<i>Cymadusa filosa</i>	32

<i>Cymadusa</i> sp. A	69, 75
<i>Cymadusa</i> sp. C	32
<i>Cymothoa excisa</i>	98
<i>Cypridea littoralis</i>	98
<i>Cyprideis littoralis</i>	82
<i>Cyprideis torosa</i>	82
<i>Cyprideis</i> sp.	82
<i>Cypridopsis</i> sp.	82
<i>Cypris</i> sp.	82
<i>Cythere</i> sp.	82
<i>Cythereis</i> sp.	82
<i>Cytherella lata</i>	82
<i>Cytherella</i> sp.	82
<i>Cytherelloidea floridana</i>	82
<i>Cytherelloidea</i> sp.	82
<i>Cytheretta sahni</i>	82
<i>Cytheretta</i> sp.	82
<i>Cytheromorpha pascagoulensis</i>	82
<i>Cytheromorpha warneri</i>	82
<i>Cytheromorpha</i> sp.	82
<i>Cytherura acuticostata</i>	82
<i>Cytherura fortulata</i>	82
<i>Cytherura gibba</i>	82
<i>Cytherura johnsoni</i>	82
<i>Cytherura rara</i>	82
<i>Cytherura wardensis</i>	82
<i>Cytherura</i> sp.	82
<i>Cytherura polita</i>	53
<i>Danaus plexippus</i>	*
<i>Darwinula</i> sp.	82
<i>Deutella incerta</i>	32
<i>Deutella</i> sp.	32
<i>Dicotendipes leucoscelis</i>	88
<i>Dione vanillae nigrior</i>	*
<i>Dissodatylus mellitae</i>	32, 89
<i>Dromidia antillensis</i>	98
<i>Dysanpanopeus texana</i>	98
<i>Dulichiella appendiculata</i>	75, 76, 77
<i>Dulichiella</i> sp. B	32
<i>Dyamanella dianae</i>	22
<i>Edotea triloba</i>	11, 14, 53, 76, 77, 80, 88, 89, 99
<i>Edotea</i> sp. A	69, 74, 75
<i>Edotea</i> sp. B	32
<i>Elasmopus levius</i>	32, 75, 76, 77, 88, 89, 92
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<i>Sicyonia dorsalis</i>	10, 111
<i>Sicyonia laevigata</i>	76, 77
<i>Sicyonia parri</i>	32, 75, 76, 77
<i>Sicyonia typica</i>	10
<i>Sicyonia</i> sp.	32
<i>Simorhynchotus antennaris</i>	98
<i>Sphaeroma quadridentata</i>	22, 89
<i>Sphaeroma terbrans</i>	98
<i>Sphaeroma walkeri</i>	98
<i>Sphaeroma</i> sp.	77
<i>Spilocuma salomani</i>	69, 74
<i>Spilocuma wattlingi</i>	98
<i>Spilocuma</i> sp.	14, 80
<i>Squilla empusa</i>	75, 76, 77, 89, 111
<i>Squilla mantis</i>	50
<i>Stegophyrus cf. hispidus</i>	98
<i>Stegophryxus</i> sp. A	77
<i>Stenetrium stebbingi</i>	76, 98
<i>Stenorhynchus seticornis</i>	98
<i>Stenothoe gallensis</i>	98
<i>Stenothoe minuta</i>	69, 74, 75
<i>Stenothoe</i> sp. A	75, 76, 77, 89
<i>Stenothoe</i> sp. E	32
<i>Stenothoe</i> sp.	22, 32
<i>Stomoxys calcitrans</i>	**
<i>Synalpheus fritzmulleri</i>	76, 77
<i>Synadelphus townsendi</i>	75
<i>Synchelidium americanum</i>	14, 32, 74, 75, 76, 77, 80, 89
<i>Synchelidium</i> sp. A	69, 74
<i>Synchelidium</i> sp.	32
<i>Tabanus</i> sp.	**
<i>Tanaidacea</i>	32, 76
<i>Tanaidacea</i> sp. A	53
<i>Tanais</i> sp.	77, 89
<i>Taphromysis bowmani</i>	53, 75, 76, 77, 89
<i>Taphromysis louisiana</i>	88
<i>Tanypus</i>	53
<i>Tephigenia</i> sp.	77

<i>Tethorchestia sp.</i>	98
<i>Thor dobbini</i>	77
<i>Thor floridana</i>	75, 76, 77
<i>Thor cf. manningi</i>	89
<i>Tiron sp.</i>	32
<i>Tozuma carolinense</i>	20, 32, 77, 89
<i>Trachypenaeus constrictus</i>	10, 32, 69, 74, 75, 76, 77, 89
<i>Trachypenaeus similis</i>	10, 32, 50
<i>Trachypenaeus sp.</i>	32
<i>Tethygenieia longleyi</i>	98
<i>Trichofoexus sp. A</i>	69, 74, 89
<i>Uca leptodactyla</i>	98
<i>Uca longisignalis</i>	98
<i>Uca minax</i>	98
<i>Uca pugilator</i>	98
<i>Uca panacea</i>	98
<i>Uca sp.</i>	89
<i>Uhlorchestia uhleri</i>	98
<i>Upogebia affinis</i>	32, 77, 99
<i>Upogebia inomissa</i>	112
<i>Upogebia sp. A</i>	32, 75, 76, 77
<i>Urobopyrus processa</i>	98
<i>Uromunna hayesi</i>	98
<i>Uromunna reynoldsi</i>	98
<i>Uromunna</i>	32
<i>Xantho denticulatus</i>	98
<i>Xenanthura brevitelson</i>	14, 32, 53, 75, 76, 77, 89, 99
<i>Xestoleberis intermedia</i>	82
<i>Xestoleberis punctata</i>	82
<i>Xestoleberis sp.</i>	82
<i>Zeuxo coralensis</i>	77

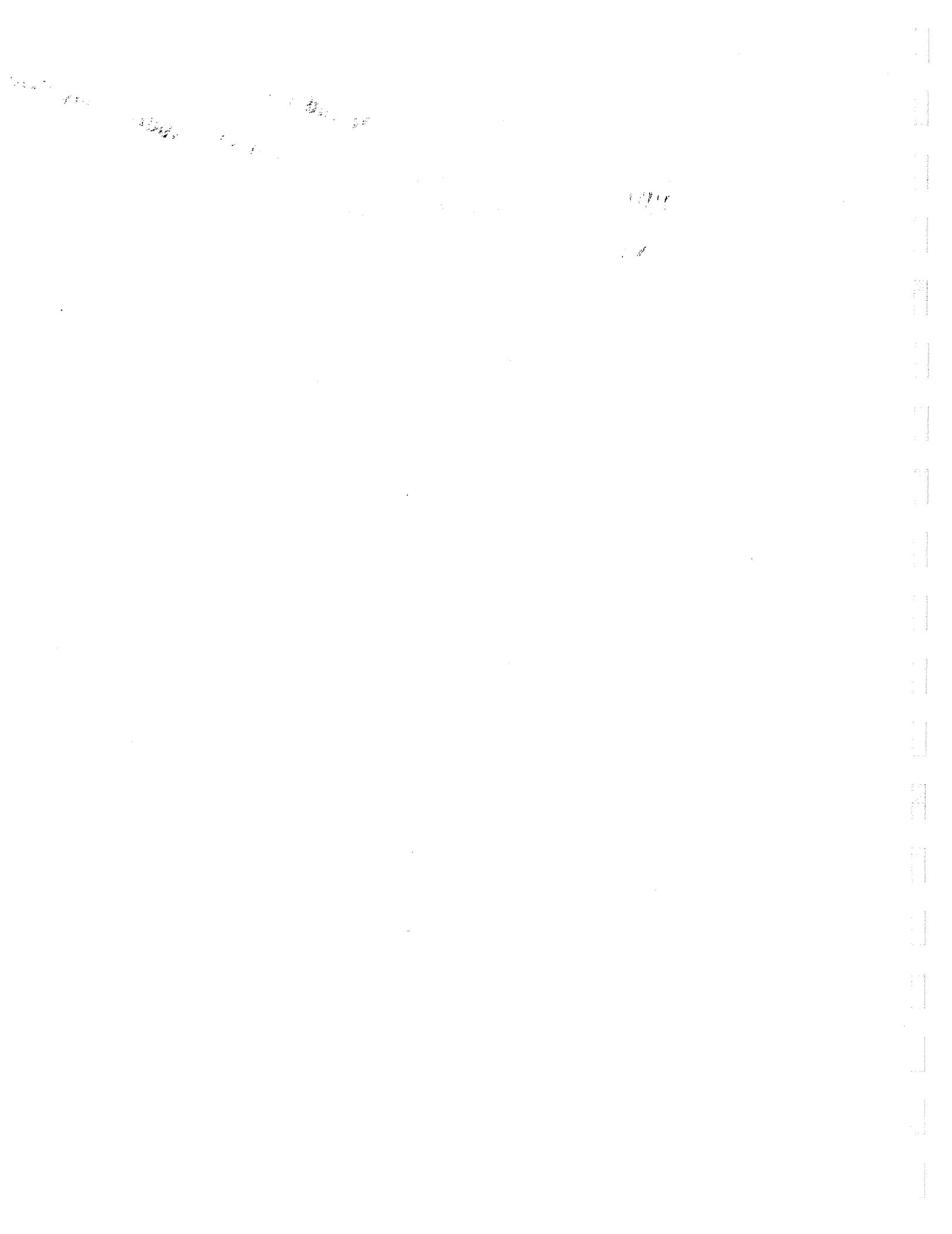
* Monarch butterfly migrates across the Bay

** pers. comm. Dr. James Cilek, Mulrennan Lab.

*Gulf Fritillary accumulates along the Bay

Appendix 10

Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary



The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Group	Family	Genus and Species	Common Name	References
Pisces	Acanthuridae	<i>Acanthurus chirurgus</i> <i>Acanthurus coeruleus</i> <i>Acanthurus randalli</i>	Doctorfish Blue tang Gulf surgeonfish	2,13 2,23 2,8,12
	Albulidae	<i>Albula vulpes</i>	Bonefish	59,66,68,81
	Anguillidae	<i>Anguilla rostrata</i>	American eel	17,50
	Antennariidae	<i>Antennarius ocellatus</i> <i>Antennarius radiosus</i> <i>Histrio gibba</i>	Ocellated frogfish Singlespot frogfish Sargassumfish	2 2,29 81
	Apogonidae	<i>Apogon maculatus</i> <i>Apogon pigmentarius</i> <i>Apogon pseudomaculatus</i> <i>Apogonichthys puncticulatus</i> <i>Astropogon atlanticus</i>	Spotted cardinalfish Dusky cardinalfish Twospot cardinalfish Blackfin cardinalfish Bronze cardinalfish	2,29 2,13 29 2 29
	Ariidae	<i>Arius felis</i> <i>Bagre marinus</i>	Hardhead catfish Gafftopsail catfish	2,17,50,59,64,65,66,67,68,72,79,81,111 2,59,66,67,68,72,79,81
	Acipenseridae	<i>Acipenser oxyrinchus desotoi</i>	Gulf sturgeon	96,*
	Atherinidae	<i>Menidiopsis martinica</i> <i>Membras vagrans</i> <i>Menidia beryllina</i> <i>Menidia peninsulae</i> <i>Menidia</i> sp.	Rough silverside Rough silverside Inland silverside Tidewater silverside	66 81 2,17,49,50,64,81 81 65
	Balistidae	<i>Aluterus scriptus</i> <i>Aluterus schoepfii</i> <i>Balistes capriscus</i> <i>Balistes carolinensis</i> <i>Monacanthus ciliatus</i> <i>Monacanthus hispidus</i>	Longtail filefish Orange filefish Gray filefish Common Triggerfish Leather fish Planehead filefish	2 59,66,68 66,72 81 2,29,64,66 2,64,66,72,81,111

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Batrachoididae	<i>Nautopaedium porosissimum</i>	2
	<i>Opsanus beta</i>	1, 49, 50, 59, 64, 68, 72, 76, 81,
	<i>Opsanus pardus</i>	49
	<i>Porichthys porosissimus</i>	50, 66
Belonidae		
	<i>Strongylura marina</i>	Atlantic needlefish
	<i>Strongylura notata</i>	Redfin needlefish
	<i>Strongylura sp.</i>	
	<i>Tylosurus acus</i>	Agujon
Blennidae		
	<i>Chasmodes saburrae</i>	Florida blenny
	<i>Chasmodes bosquianus</i>	
	<i>Hypoleurochilus bermudensis</i>	Barred blenny
	<i>Hypoleurochilus geminatus</i>	Crested blenny
	<i>Hypsoblennius henizi</i>	Feather blenny
	<i>Hypsoblennius ionthas</i>	Freckled blenny
	<i>Parablennius marmoreus</i>	Seaweed blenny
Bothidae		
	<i>Ancylostea quadrocavellata</i>	Ocellated flounder
	<i>Bothus robustus</i>	Twospot flounder
	<i>Citharichthys macrops</i>	Spotted whiff
	<i>Citharichthys spilopterus</i>	Bay whiff
	<i>Etoropis crossotus</i>	Fringed flounder
	<i>Paralichthys albiguttata</i>	Gulf flounder
	<i>Paralichthys lethostigma</i>	Southern flounder
	<i>Paralichthys sp.</i>	
	<i>Syacium gunteri</i>	Shoal flounder
	<i>Syacium papillosum</i>	Dusky flounder
Bythitidae	<i>Ogilbia cayorum</i>	Key brotula
Carangidae		
	<i>Alectis crinitus</i>	African pompano
	<i>Caranx bartholomaei</i>	Yellow jack
	<i>Caranx cryos</i>	Blue runner
	<i>Caranx hippos</i>	Crevalle jack
	<i>Caranx latus</i>	Horse-eye jack
	<i>Caranx ruber</i>	Bar jack
		**

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

<i>Chiloscombrus chrysurus</i>	Atlantic bumper	2, 59, 59, 64, 66, 68, 79, 81
<i>Decapterus punctatus</i>	Round scad	2
<i>Hemicarax amblyrhynchus</i>	Bluntnose jack	81
<i>Oligoplites saurus</i>	Leatherjacket	
<i>Selar crumenophthalmus</i>	Bigeye scad	66
<i>Selene vomer</i>	Lookdown	81
<i>Selene setapinnus</i>	Atlantic moonfish	2, 59, 66, 68, 111
<i>Seriola dumerili</i>	Greater amberjack	29, 72
<i>Trachinotus carolinus</i>	Florida pompano	2, 59, 64, 65, 68, 72, 79, 81
<i>Trachurus lathami</i>	Rough scad	66
 	Pearlfish	29
 	Blacknose shark	59, 68, 81
 Carapidae	Finetooth shark	59, 68, 81
 <i>Carcharhinidae</i>	Bull shark	59, 65, 81
 <i>Carcharhinus acronotus</i>	Blacktip shark	59, 68, 81, 111
 <i>Carcharhinus isodon</i>	Dusky shark	**
 <i>Carcharhinus leucas</i>	Sandbar shark	59, 68, 81
 <i>Carcharhinus limbatus</i>	Tiger shark	72
 <i>Carcharhinus obscurus</i>	Smooth dogfish shark	**
 <i>Carcharhinus plumbeus</i>	Florida smooth hound	59
 <i>Carcharhinus sp.</i>	Lemon shark	**
 <i>Galeocerdo cuvier</i>	Atlantic sharpnose shark	59, 66, 67, 68, 79, 81
 <i>Mustelus canis</i>	Bluegill	64, 72
 <i>Mustelus norrisi</i>	Redear sunfish	72
 <i>Negaprion brevirostris</i>	Largemouth bass	64
 <i>Rhizoprionodon terraenovae</i>	Common snook	15, 29, 81
 Centrarchidae	Foureye butterflyfish	2
 <i>Lepomis macrochirus</i>	Spotfin butterflyfish	2
 <i>Lepomis microlophus</i>	Reef butterflyfish	29
 <i>Micropterus salmoides</i>	Banded butterflyfish	2, 13
 Centropomidae		
 <i>Chaetodontidae</i>		
 <i>Chaetodon capistratus</i>		
 <i>Chaetodon ocellatus</i>		
 <i>Chaetodon sedentarius</i>		
 <i>Chaetodon striatus</i>		

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Clupeidae	<i>Alosa alabamae</i>	Alabama shad 59, 65, 68
	<i>Alosa chrysocloris</i>	Skipjack herring 59, 66, 68
	<i>Alosa aestivalis</i>	Blueback herring 17
	<i>Brevoortia patronus</i>	Gulf menhaden 2, 50, 59, 65, 66, 68, 79
	<i>Brevoortia smithii</i>	17, 50, 59, 68, 79
	<i>Brevoortia smithii x patronus</i>	59, 67, 68
	<i>Dorosoma cepedianum</i>	17
	<i>Dorosoma petenense</i>	2, 49, 50, 66, 81
	<i>Etrumeus teres</i>	66
	<i>Harangula jaguana</i>	2, 64, 66, 68, 81
	<i>Opisthonema oglinum</i>	2, 29, 59, 66, 68, 81
	<i>Sardinella anchovia</i>	2, 66
Congridae	<i>Ariosoma impressa</i>	66
	<i>Conger catadilimbatus</i>	Margintail conger 2
	<i>Conger oceanicus</i>	Conger eel 2, 29
	<i>Symphurus plaguosa</i>	Blackcheek tonguefish 2, 49, 81
Cynoglossidae		
Cyprinidae	<i>Notropis petersoni</i>	Coastal shiner 643
	<i>Hypophthalmichthys nobilis</i> (= <i>Aristichthys</i>)	Bighead carp ***
Cyprinodontidae		
	<i>Adinia xenica</i>	Diamond killifish 2, 17, 49, 64, 81
	<i>Cyprinodon variegatus</i>	Sheepshead minnow 2, 49, 50, 64, 65, 81
	<i>Fundulus confluentus</i>	Marsh killifish 17, 81
	<i>Fundulus grandis</i>	Gulf killifish 2, 17, 49, 50, 64, 65, 81
	<i>Fundulus similis</i>	Longnose killifish 2, 17, 49, 50, 64, 81
	<i>Lucania parva</i>	Rainwater killifish 2, 49, 50, 64
Dasyatidae	<i>Dasyatis americana</i>	Southern stingray 81
	<i>Dasyatis sabina</i>	Atlantic stingray 2, 49, 50, 64, 66, 81
	<i>Dasyatis sayi</i>	Bluntnose stingray 2, 64, 66, 81
	<i>Gymnura micrura</i>	Smooth butterfly ray 66
Echeneidae	<i>Echeneis paucrates</i>	Sharksucker 2, 81
	<i>Echeneis neucratoides</i>	Whitetip sharksucker 66, 68
	<i>Remora remora</i>	Remora 59

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Elopidae	<i>Elops saurus</i> <i>Megalops atlanticus</i>	Ladyfish Tarpon	2, 59, 64, 68, 79, 81 59, 65, 81
Engraulidae	<i>Anchoa hepsetus</i> <i>Anchoa lyolepis</i> <i>Anchoa mitchilli</i> <i>Anchoa cubana</i> <i>Anchoa nasuta</i> <i>Engraulis eurystole</i>	Striped anchovy Dusky anchovy Bay anchovy Cuban anchovy Longnose anchovy Silver anchovy	2, 64, 66, 81 2 2, 29, 50, 51, 64, 65, 66, 81, 111 29 50, 66 64
Ephippidae	<i>Chaetodipterus faber</i>	Atlantic spadefish	2, 50, 59, 66, 68, 72, 81
Exocetidae	<i>Hemirhamphus brasiliensis</i> <i>Hyporhamphus unifasciatus</i>	Ballyhoo Halfbeak	2, 29 2, 29, 59, 64, 81
Gadidae	<i>Urophycis floridana</i>	Southern hake	2, 50, 66
Gerridae	<i>Eucinostomus argenteus</i> <i>Eucinostomus gula</i>	Spotfin mojarra Silver jenny	2, 17, 49, 50, 64, 66 2, 49, 50, 64, 66
Gobiesocidae	<i>Gobiesox strumosus</i>	Skilletfish	2
Gobiidae	<i>Bathygobius soporator</i> <i>Balimania communis</i> <i>Gobiodoides broussonnetii</i> <i>Gobionellus boleosoma</i> <i>Gobionellus hastatus</i> <i>Gobionellus oceanicus</i> <i>Gobionellus shufeldti</i> <i>Gobiosoma boscii</i> <i>Gobiosoma robustum</i> <i>Microgobius gulosus</i>	Frillfin goby Ragged goby Violet goby Darter goby Sharpail goby Highfin goby Freshwater goby Naked goby Code goby Clown goby	50, 64, 66 66 66 66 50, 66 2 49, 64 2, 17, 51, 64, 81, 88 17, 20, 51, 64, 65, 74, 75, 76, 77 2, 17, 49, 64
Haemulidae	<i>Haemulon aurolineatum</i> <i>Haemulon parva</i> <i>Haemulon plumieri</i> <i>Orthopristis chrysoptera</i>	Tomatate Sailor's choice White grunt Pigfish	2, 66, 72 ** 2 2, 50, 51, 59, 64, 66, 68, 72, 79, 111

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Holocentridae	<i>Holocentrus ascensionis</i>	Squirrelfish	2
	<i>Holocentrus vexillarius</i>	Dusky squirrelfish	29
Kyphosidae	<i>Kyphosus incisor</i>	Yellowchin	29
	<i>Kyphosus sexfasciatus</i>	Bermuda chub	**
Labridae	<i>Doratonotus megalepis</i>	Dwarf wrasse	2
	<i>Halichoeres bimaculatus</i>	Slippery dick	2
	<i>Halichoeres caudalis</i>	Painted wrasse	2
	<i>Halichoeres maculipinnis</i>	Clown wrasse	2
	<i>Halichoeres radiatus</i>	Puddingwife	29
	<i>Hemipteronotus novacula</i>	Pearly razorfish	2, 64
	<i>Lachnolaimus maximus</i>	Hogfish	29
	<i>Thalassoma bifasciatum</i>	Bluehead	2
Lepisosteidae	<i>Lepisosteus osseus</i>	Longnose gar	17, 29, 59, 66, 68, 81
	<i>Lepisosteus spathula</i>	Alligator gar	81
Lobotidae	<i>Lobotes surinamensis</i>	Tripletail	29, 59, 68, 81
Lutjanidae	<i>Lutjanus analis</i>	Mutton snapper	2, 29
	<i>Lutjanus apodus</i>	Schoolmaster	2, 29, 81
	<i>Lutjanus campechanus</i>	Red snapper	2, 66, 81
	<i>Lutjanus griseus</i>	Gray snapper	2, 17, 50, 59, 64, 65, 66, 68, 72, 81
	<i>Lutjanus synagris</i>	Lane snapper	2, 49, 64, 66
	<i>Rhombocephalus aurorubens</i>	Vermillion snapper	72
Mobulidae	<i>Manta birostris</i>	Manta ray	***
Mugilidae	<i>Mugil cephalus</i>	Striped mullet	2, 17, 49, 50, 59, 64, 65, 67, 68, 81
	<i>Mugil curema</i>	White mullet	2, 50, 59, 64, 68, 89
	<i>Mugil trichodon</i> (= <i>gyrans</i>)	Fantail mullet	2
Mugilidae	<i>Mullus auratus</i>	Red grouper	66
	<i>Mullus dichthys dentatus</i>	Red goatfish	**

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Muraenidae	<i>Gymnothorax funebris</i> <i>Gymnothorax moringa</i> <i>Gymnothorax nigromarginatus</i> <i>Gymnothorax saxicola</i>	Green moray Spotted moray Blackedge moray Ocellated moray	81 29 2, 66 2, 81
Mylobatidae	<i>Rhinoptera bonasus</i>	Cownose ray	68, 81
Ogcocephalidae	<i>Ogcocephalus nasutus</i> <i>Ogcocephalus radiatus</i>	Shortnose batfish Polka-dot batfish	81 66
Opichthidae	<i>Ahlia egmontis</i> <i>Bascanichthys securiferus</i> <i>Lethrinus xanthurus</i> <i>Myrophis punctatus</i> <i>Mysriophis intercinctus?</i> <i>Ophichthus gomesi</i> <i>Ophichthus ocellatus?</i>	Key worm eel Whip eel Sailfin eel Speckled worm eel Shrimp eel	2, 29 2, 29, 50, 81 29 2 81 50, 59, 66, 68, 81 68
Ophidiidae	<i>Lepophidium brevibarbe</i> <i>Ophidion grayi</i> <i>Ophidion halbrookii</i> <i>Ophidion marginatum</i> <i>Ophidion welshi</i> <i>Otopholidium welshi</i>	Blackedge cusk-eel Blotched cusk-eel Bank cusk-eel Striped cusk-eel Crested cusk-eel Polka-dot cusk-eel	66 66 29 2 50, 66, 111 50
Ostraciidae	<i>Lactophrys quadricornis</i> (= <i>Acanthostracion</i>) <i>Lactophrys trigonus</i>	Scrawled cowfish Trunkfish	64, 66, 68, 72, 111 81
Petromyzontidae	<i>Ichthyomyzon gagei</i>	Lamprey	81
Poeciliidae	<i>Poecilia latipinna</i>	Sailfin molly	2, 29, 50, 64, 81,
Polynemidae	<i>Polydactylus octonemus</i>	Atlantic threadfin	2, 29, 59, 64, 66
Pomacanthidae	<i>Holocanthus ciliaris</i> <i>Holocanthus bermudensis</i>	Queen angelfish Blue angelfish	2 ***

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Pomacentridae	<i>Pomacentrus arcuatus</i>	Gray angelfish ***
	<i>Abudefduf saxatilis</i>	Sergeant major 12
	<i>Abudefduf taurinus</i>	Night Sergeant 29
	<i>Eupomacentrus variabilis</i>	Cocoa damselfish 2
	<i>Pomacentrus fuscus</i>	Dusky damselfish 29
	<i>Pomacentrus leucostictus</i>	Beaugregory ***
	<i>Pomacentrus xanthurus</i>	13
Pomatomidae	<i>Pomatomus saltatrix</i>	Bluefish 19, 59, 65, 66, 67, 68, 72, 79, 81
Priacanthidae	<i>Priacanthus arenatus</i>	Bigeye 68
	<i>Pristigenys alata</i>	**
Pristidae	<i>Pristis perotlei</i>	Largetooth sawfish 81
Rachycentridae	<i>Rachycentron canadum</i>	Cobia 59, 66, 68, 72
Rajidae	<i>Raja eglanteria</i> <i>Raja texana</i>	Clearnose ray Round skate 2, 29, 66 2, 81
Rhinodontidae	<i>Gymnophostoma cirratum</i>	Nurse shark **
Rhinobatidae	<i>Rhinobatos lentiginosus</i>	Atlantic guitarfish 81
Scoridae	<i>Cryptotomus roseus</i> <i>Nicholsina ustta</i> <i>Scarus croicensis</i> <i>Scarus coeruleus</i> <i>Scarus gratianai</i> <i>Sparisoma abildgaardii</i> <i>Sparisoma aurofrenatum</i> <i>Sparisoma chrysopterum</i> <i>Sparisoma radicans</i> <i>Sparisoma rubripinne</i> <i>Sparisoma viride</i>	Bluelip parrotfish Emerald parrotfish Striped parrotfish Midnight parrotfish Rainbow parrotfish Red parrotfish Redband parrotfish Redtail parrotfish Bucktooth parrotfish Redfin parrotfish Stoplight parrotfish 2 2, 64 2 29 2 2 29 2 2 2 2 2 29

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Sciaenidae	<i>Bairdiella chrysoura</i>	Silver perch	2, 17, 49, 50, 64, 65, 66, 68, 72
	<i>Cynoscion arenarius</i>	Sand seatrout	2, 29, 50, 59, 64, 65, 66, 68, 72, 79, 81, 111
	<i>Cynoscion nebulosus</i>	Spotted seatrout	2, 17, 49, 50, 59, 64, 65, 66, 68, 72, 79, 81
	<i>Equetus acuminatus</i>	Hightail	2
	<i>Equetus lanceolatus</i>	Jackknife-fish	29, 66
	<i>Equestris umbrosus</i>	Cubbyu	2, 66
	<i>Leiostomus xanthurus</i>	Spotted seatrout	2, 49, 50, 59, 64, 75, 66, 68, 72, 79, 81, 111
	<i>Menticirrhus americanus</i>	Southern kingfish	2, 64, 66, 68
	<i>Menticirrhus fasciatus</i>	Gulf Kingfish	64
	<i>Menticirrhus littoralis</i>	Atlantic croaker	2, 50, 59, 64, 65, 66, 67, 68, 72, 79, 81, 111
Scombridae	<i>Micropogonias undulatus</i>	Black drum	17, 29, 59, 65, 68, 72
	<i>Pogonias cromis</i>	Red drum	17, 50, 65, 72, 81
	<i>Sciaenops ocellatus</i>	Star drum	66, 81
	<i>Stellifer lanceolatus</i>	Frigate mackerel	63, 81
	<i>Auxis thazard</i>	Little tunny	19, 59, 63, 67, 68, 72, 79, 81
	<i>Euthynnus alletteratus</i>	Atlantic bonito	63
	<i>Sarda sarda</i>	Chub mackerel	63, 66
	<i>Scomber japonicus</i>	King mackerel	63, 66, 72
	<i>Scomberomorus cavalla</i>	Spanish mackerel	59, 65, 66, 67, 68, 72, 79, 81
	<i>Scomberomorus maculatus</i>	Cero mackerel	
Scorpaenidae	<i>Scorpaena brasiliensis</i>	Barbfish	2, 66
	<i>Scorpaena calcarata</i>	Smoothhead scorpionfish	29
	<i>Scorpaena plumieri</i>	Spotted scorpionfish	2, 29
Serranidae	<i>Centropristes melana</i>	Southern sea bass	59, 66, 68
	<i>Centropristes ocyurus</i>	Bank sea bass	66
	<i>Centropristes philadelphica</i>	Rock sea bass	2, 66
	<i>Centropristes striata</i>	Black sea bass	81
	<i>Diplecium bivittatum</i>	Dwarf sand perch	66, 111
	<i>Diplectrum formosum</i>	Sand perch	2, 59, 66, 68, 72
	<i>Epinephelus analogus</i>	Spotted cabrilla	2
	<i>Epinephelus itajara</i>	Jewfish	81
	<i>Epinephelus morio</i>	Red grouper	3, 81
	<i>Myceteroperca bonaci</i>	Black grouper	2

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

	<i>Mycteroperca microlepis</i>	Gag grouper Whitespotted soapfish	2, 59, 64, 66, 68, 72, 101 66
	<i>Rypticus maculatus</i>	Greater soapfish	2
	<i>Rypticus saponaceus</i>	Pigmy sea bass	66
	<i>Serranichthys pumilio</i>	Belted sandfish	2, 18, 28, 66, 106
	<i>Serranus subligatus</i>		
Soleidae	<i>Achirus lineatus</i>	Lined sole	2, 29, 49, 50, 64, 66, 81
	<i>Gymnachirus melas</i>	Naked sole	66
	<i>Syphurus plagiusa</i>	Balckcheeked tonguefish	17, 50, 64, 77, 111
	<i>Trinectes maculatus</i>	Hogchoker	2, 17, 29, 49, 50, 51, 59, 64, 66, 68, 81
Sparidae	<i>Archosargus probatocephalus</i>	Sheepshead	2, 50, 59, 65, 66, 68, 72, 81, 111
	<i>Calamus arcifrons</i>	Grass porgy	2, 81
	<i>Diplodus holbrooki</i>	Spotted pinfish	2
	<i>Lagodon rhomboides</i>	Pinfish	2, 17, 49, 50, 59, 64, 65, 66, 67, 68, 72, 79, 81, 111
	<i>Stenotomus capitanus</i>	Longspine porgy	2, 29, 66, 111
	<i>Sphyraena barracuda</i>	Great barracuda	2, 64, 81
	<i>Sphyraena borealis</i>	Northern sennet	2, 64, 66
	<i>Sphyraena guachancho</i>	Guaguanche	59, 66, 68
Sphyraenidae	<i>Sphyraena dipiana</i> (= <i>zygaena</i>)		81
	<i>Sphyraena lewini</i>	Scallophead hammerhead	66, 68
	<i>Sphyraena tiburo</i>	Bonnethead shark	59, 66, 68, 79, 81
			2
Stromateidae	<i>Peprius alepidotus</i>	Harvestfish	2, 50, 59, 66, 68, 81
	<i>Peprius burii</i>	Gulfbutterfish	50, 66, 68, 111
	<i>Peprius triacanthus</i>	Butterfish	2
Syngnathidae	<i>Hippocampus erectus</i>	Lined seahorse	2, 50, 64, 66
	<i>Hippocampus hudsonius</i>	Spotted seahorse	81
	<i>Hippocampus regulus</i>		2, 81
	<i>Hippocampus zosterae</i>	Dwarf seahorse	2, 64
	<i>Micrognathus crinitigerus</i>	Fringed pipefish	75, 76, 77, 81
	<i>Syngnathus floridae</i>	Dusky pipefish	2, 64
	<i>Syngnathus louisianae</i>	Chain pipefish	2, 64, 66, 81
	<i>Syngnathus scovelli</i>	Gulf pipefish	2, 17, 49, 64, 81

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Synodontidae	<i>Synodus foetans</i>	Inshore lizardfish	2, 50, 59, 64, 66, 68, 72, 79, 81, 111
Tetraodontidae	<i>Chilomycterus schoepfi</i>	Striped burrfish	49, 50, 59, 64, 66, 68, 72, 81, 111
	<i>Chilomycterus antillarum</i>	Web burrfish	64
	<i>Lagocephalus laevigatus</i>	Smooth puffer	66, 81
	<i>Sphoeroides nephelus</i>	Southern puffer	2, 49, 50, 64, 66, 68, 81
	<i>Sphoeroides parvus</i>	Least puffer	64, 66
	<i>Sphoeroides spengleri</i>	Bandtail puffer	29
Torpedinidae	<i>Narcine brasiliensis</i>	Lesser electric ray	50, 81
Triglidae	<i>Prionotus maris</i>	Barred searobin	2
	<i>Prionotus ophryras</i>	Bandtail searobin	66
	<i>Prionotus pecioidalis</i>	Blackwing searobin	2
	<i>Prionotus rubio</i>	Bigeye searobin	66
	<i>Prionotus salmonicolor</i>	Leopard searobin	2, 64, 68, 81, 111
	<i>Prionotus scitulus</i>	Bighead searobin	2, 50, 59, 66, 68, 81, 111
Uranoscopidae	<i>Astrotscopus y-gracum</i>	Southern stargazer	2, 59, 64, 66, 68, 81
*			
* 1 live and 1 dead specimen			
** based on information from Michael Brim			
*** 1 specimen from base of Deer Point dam			
**** NMFS biologist report			
Amphibians			
Hylidae		<i>Hyla squirella</i>	Squirrel treefrog
		<i>Hyla cinerea</i>	Green treefrog
Microhylidae		<i>Gastrothryne carolinensis</i>	Eastern narrow-mouthed toad
Ranidae		<i>Rana pipiens sphenocephala</i>	Southern Leopard frog

The Fish, Amphibians, and Reptiles Reported from the St. Andrew Bay Estuary

Reptiles	Ashton & Ashton ¹¹⁵	Trionychidae	<i>Trionyx ferox</i>	Florida softshell	*
		Chelonidae	<i>Caretta caretta</i> <i>Chelonia mydas</i> <i>Lepidochelys kempii</i>	Loggerhead turtle Atlantic green turtle Atlantic ridley turtle	Watson **
		Dermochylidae	<i>Dermochelys coriacea</i>	Leatherback turtle	89
		Emydidae	<i>Malaclemys terrapin</i>	Diamondback terrapin	*
		Iguanidae	<i>Anolis carolinensis</i>	Green Anole	*
		Scincidae	<i>Eumecea imparipinnis</i>	Southeastern five-lined skink	*
		Viperidae	<i>Crotalus adamanteus</i>	Eastern Diamondback rattlesnake	*
		Colubridae	<i>Coluber constrictor priapus</i> <i>Drymarchon corais couperi</i> <i>Elaphe guttata</i> <i>Masticophis flagellum</i>	Southern racerunner Indigo snake Corn snake Eastern coachwhip	*
		Alligatoridae	<i>Alligator mississippiensis</i>	American alligator	

** pers. Comm. Larry Ogren

* within range or pers. observations

Appendix 11

Birds and Mammals Reported from the St. Andrew Bay Estuary



AVESfrom Loftin et al.⁵⁶

Family	Genus and Species	Common Name
Accipitridae	<i>Accipiter cooperi</i> <i>Accipiter striatus</i> <i>Buteo jamaicensis</i> <i>Buteo lineatus</i> <i>Buteo platypterus</i> <i>Circus cyaneus</i> <i>Elanoides forficatus</i> <i>Falco columbarius</i> <i>Falco peregrinus</i> <i>Falco sparverius</i> <i>Haliaeetus leucocephala</i> <i>Ictinea mississippiensis</i> <i>Pandion haliaetus</i>	Cooper's hawk Sharp-shinned hawk Red-tailed hawk Red-shouldered hawk Broad-winged hawk Northern harrier American swallow-tailed kite Merlin Peregrine falcon American kestrel Bald eagle Mississippi kite Osprey
Alcedinidae	<i>Ceryle alcyon</i>	Belted kingfisher
Anatidae	<i>Aix sponsa</i> <i>Anas acuta</i> <i>Anas americana</i> <i>Anas clypeata</i> <i>Anas crecca</i> <i>Anas discolor</i> <i>Anas platyrhynchos</i> <i>Anas rubripes</i> <i>Anas strepera</i> <i>Aythya affinis</i> <i>Aythya americana</i> <i>Aythya collaris</i> <i>Aythya marilla</i> <i>Aythya valisneria</i> <i>Branta canadensis</i> <i>Bucephala albeola</i> <i>Bucephala clangula</i> <i>Chen caerulescens</i> <i>Clangula hyemalis</i> <i>Lophodytes cucullatus</i> <i>Melanitta fusca</i> <i>Melanitta nigra</i> <i>Melanitta perspicillata</i> <i>Mergus merganser</i> <i>Mergus serrator</i> <i>Oxyura jamaicensis</i>	Wood duck Norther Pintail American widgeon Northern shoveler Green-winged teal Blue-winged teal Mallard American black duck Gadwall Lesser scaup Redhead Ring-necked duck Greater scaup Canvasback Canada goose Bufflehead Common Goldeneye Blue goose Oldsquaw Hooded merganser White-winged scoter Black scoter Surf scoter Common merganser Red-breasted merganser Ruddy duck
Anhingidae	<i>Anhinga anhinga</i>	Anhinga
Apodidae	<i>Chaetura pelagica</i>	Chimney swift
Aramidae	<i>Aramus guarauna</i>	Limpkin
Ardeidae	<i>Ardea herodias</i> <i>Botaurus lentiginosus</i> <i>Bubulcus ibis</i>	Great blue heron American bittern Cattle egret

	<i>Butrides striatus</i>	Little green heron
	<i>Casmerodius albus</i>	Great egret
	<i>Egretta caerulea</i>	Little blue heron
	<i>Egretta rufescens</i>	Reddish egret
	<i>Egretta thula</i>	Snowy egret
	<i>Egretta tricolor</i>	Tricolored heron
	<i>Ixobrychus exilis</i>	Least bittern
	<i>Nycticorax nycticorax</i>	Black-crowned heron
	<i>Nycticorax violaceus</i>	Yellow-crowned Night-heron
Bombycillidae	<i>Bombycilla cedrorum</i>	Cedar waxwing
Caprimulgidae	<i>Caprimulgis carolinensis</i> <i>Chordeiles minor</i>	Chuck-will's widow Common nighthawk
Cathartidae	<i>Coragyps atratus</i> <i>Cathartes aura</i>	Black vulture Turkey vulture
Charadriidae	<i>Charadrius alexandrinus</i> <i>Charadrius melanotos</i> <i>Charadrius semipalmatus</i> <i>Charadrius vociferus</i> <i>Charadrius wilsonia</i> <i>Pluvialis dominica</i> <i>Pluvialis squatarola</i>	Snowy plover Piping plover Semipalmated plover Killdeer Wilson's plover Lesser golden plover Black-bellied plover
Ciconiidae	<i>Mycteria americana</i>	Wood stork
Columbidae	<i>Columba livia</i> <i>Columbina passerina</i> <i>Streptopelia decaocto</i> <i>Zenaida macroura</i>	Rock dove Common ground dove European collard dove Mourning dove
Corvidae	<i>Corvus ossifragus</i> <i>Cyanocitta cristata</i>	Fish crow Blue jay
Cuculidae	<i>Coccyzus americanus</i> <i>Coccyzus erythrophthalmus</i> <i>Crotophaga sulcirostris</i>	Yellow-billed cuckoo Black-billed cuckoo Groove-billed ani
Emberizidae	<i>Agelaius phoeniceus</i> <i>Cardinalis cardinalis</i> <i>Dendroica discolor</i> <i>Dendroica dominica</i> <i>Dendroica fusca</i> <i>Dendroica palmarum</i> <i>Dendroica pennsylvanica</i> <i>Dendroica petechia</i> <i>Dendroica pinus</i> <i>Dendroica virens</i> <i>Guiraca caerulea</i>	Red-winged blackbird Northern cardinal Prairie warbler Yellow-throated warbler Blackburnian warbler Palm warbler Chestnut-sided warbler Yellow warbler Pine warbler Black-throated green warbler Blue grosbeak

	<i>Icterus spurius</i>	Orchard oriole
	<i>Melospiza georgiana</i>	Swamp sparrow
	<i>Melospiza melodia</i>	Song sparrow
	<i>Mniotilla varia</i>	Black-and-white warbler
	<i>Molothrus ater</i>	Brown-headed cowbird
	<i>Parula americana</i>	Northern parula
	<i>Passarina cyanea</i>	Indigo bunting
	<i>Passerculus sandwichensis</i>	Savannah sparrow
	<i>Pheucticus ludovicianus</i>	Rose-breasted grosbeak
	<i>Pipilo erythrrophthalmus</i>	Rufous-sided towhee
	<i>Piranga rubra</i>	Summer tanager
	<i>Pooecetes gramineus</i>	Vesper sparrow
	<i>Prothonotaria citrea</i>	Prothonotary warbler
	<i>Quiscalus quisculas</i>	Common grackle
	<i>Seiurus motacilla</i>	Louisiana waterthrush
	<i>Seiurus noveboracensis</i>	Northern waterthrush
	<i>Seiurus aurocapillus</i>	Ovenbird
	<i>Setophaga ruticilla</i>	American redstart
	<i>Spizella passerina</i>	Chipping sparrow
	<i>Spizella pusilla</i>	Field sparrow
	<i>Sturnella magna</i>	Eastern meadowlark
	<i>Vermivora celata</i>	Orange-crowned warbler
	<i>Vermivora peregrina</i>	Tennessee warbler
	<i>Wilsonia citrina</i>	Hooded warbler
	<i>Zonotrichia albicollis</i>	White-throated sparrow
Fregatidae	<i>Fregata magnificens</i>	Magnificent frigatebird
Fringillidae	<i>Carduelis tristis</i>	American goldfinch
Gaviidae	<i>Gavia immer</i>	Common loon
	<i>Gavia stellata</i>	Red-throated loon
Gruidae	<i>Grus canadensis</i>	Sandhill crane
Haematopodidae	<i>Haematopus palliatus</i>	American oystercatcher
Hirundinidae	<i>Hirundo rustica</i>	Barn swallow
	<i>Progne subis</i>	Purple martin
	<i>Riparia riparia</i>	Bank swallow
	<i>Stelgidopteryx ruficollis</i>	Northern rough-winged swallow
	<i>Tachycineta bicolor</i>	Tree swallow
Hydrobatidae	<i>Oceanites oceanicus</i>	Wilson's Storm-petrel (accidental)
Laridae	<i>Chlidonias niger</i>	Black tern
	<i>Larus atricilla</i>	Laughing gull
	<i>Larus delawarensis</i>	Ring-billed gull
	<i>Larus marinus</i>	Great black-backed gull
	<i>Larus philadelphia</i>	Bonaparte's gull
	<i>Rynchops niger</i>	Black skimmer

	<i>Stercorarius parasiticus</i>	Parasitic jaeger
	<i>Sterna anaethetus</i>	Bridled tern
	<i>Sterna antillarum</i>	Least tern
	<i>Sterna caspia</i>	Caspian tern
	<i>Sterna forsteri</i>	Forster's tern
	<i>Sterna hirundo</i>	Common tern
	<i>Sterna maxima</i>	Royal tern
	<i>Sterna nilotica</i>	Gull-billed tern
	<i>Sterna sandvicensis</i>	Sandwich tern
Mimidae	<i>Dumatella carolinensis</i>	Gray catbird
	<i>Mimus polyglottus</i> *	Northern mockingbird
	<i>Toxostoma rufum</i>	Brown thrasher
Muscicapidae	<i>Catharus fuscescens</i>	Veery
	<i>Catharus guttatus</i>	Hermit thrush
	<i>Hylocichla mustelina</i>	Wood thrush
	<i>Polioptila caerulea</i>	Blue-gray gnatcatcher
	<i>Regulus calendula</i>	Ruby-crowned kinglet
	<i>Regulus satrapa</i>	Golden-crowned kinglet
	<i>Turdus migratorius</i>	American robin
Paridae	<i>Parus carolinensis</i>	Carolina chickadee
	<i>Parus bicolor</i>	Tufted titmouse
Passaridae	<i>Passer domesticus</i>	House sparrow
Pelecanidae	<i>Pelecanus erythrorhynchos</i>	American white Pelican
	<i>Pelecanus occidentalis</i>	Brown pelican
Phalacrocoracidae	<i>Phalacrocorax auritus</i>	Double-crested cormorant
Phasianidae	<i>Colinus virginicus</i>	Northern bobwhite
	<i>Meleagris gallopavo</i>	Wild turkey
Picidae	<i>Colaptes auratus</i>	Northern flicker
	<i>Melanerpes carolinus</i>	Red-bellied woodpecker
	<i>Melanerpes erythrocephalus</i>	Red-headed woodpecker
	<i>Picoides pubescens</i>	Downy woodpecker
	<i>Sphyrapicus varius</i>	Yellow-bellied sapsucker
Podicipedidae	<i>Aechmophorus occidentalis</i>	Western grebe
	<i>Podiceps auritus</i>	Horned grebe
	<i>Podiceps grisegena</i>	Red-necked grebe
	<i>Podiceps nigricollis</i>	Eared grebe
	<i>Podilymbus podiceps</i>	Pied-billed grebe
Procellariidae	<i>Puffinus gravis</i>	Greater Shearwater

Rallidae	<i>Fulica americana</i> <i>Gallinula chloropus</i> <i>Laterallus jamaicensis</i> <i>Porphyrrula martinica</i> <i>Porzana carolina</i> <i>Rallus elegans</i> <i>Rallus limicola</i> <i>Rallus longirostris</i>	American coot Common moorhen Black rail Purple gallinule Sora King rail Virginia rail Clapper rail
Recurvirostridae	<i>Himantopus mexicanus</i> <i>Recurvirostra americanus</i>	Black-necked stilt American avocet
Scolopacidae	<i>Actitis macularia</i> <i>Arenaria interpres</i> <i>Calidris minutilla</i> <i>Calidris alba</i> <i>Calidris alpina</i> <i>Calidris canutus</i> <i>Calidris fuscicollis</i> <i>Calidris himantopus</i> <i>Calidris mauri</i> <i>Calidris melanotos</i> <i>Calidris pusilla</i> <i>Catoptrophorus semiplumatus</i> <i>Gallinago gallinago</i> <i>Limnodromus griseus</i> <i>Limosa haemastica</i> <i>Numenius phaeopus</i> <i>Phalaropus tricolor</i> <i>Scolopax minor</i> <i>Tringa flavipes</i> <i>Tringa melanoleuca</i> <i>Tringa solitaria</i>	Spotted sandpiper Ruddy turnstone Least sandpiper Sanderling Dunlin Red knot White-rumped sandpiper Stilt sandpiper Western sandpiper Pectoral sandpiper Semipalmated sandpiper Willet Common snipe Short-billed dowitcher Hudsonian godwit Whimbrel Wilson's phalarope Woodcock Lesser yellowlegs Greater yellowlegs Solitary sandpiper
Sittidae	<i>Cerithia americana</i> <i>Sitta canadensis</i> <i>Sitta pusilla</i>	Brown creeper Red-breasted nuthatch Brown-headed nuthatch
Strigidae	<i>Bubo virginianus</i> <i>Otus asio</i> <i>Strix varia</i>	Great horned owl Eastern screech owl Barred owl
Sturnidae	<i>Sturnus vulgaris</i>	European starling
Sulidae	<i>Sula bassanoides</i> <i>Sula dactylatra</i> <i>Sula leucogaster</i>	Masked booby Brown booby Northern gannet
Threskiornithidae	<i>Eudicimus albus</i> <i>Plegadis falcinellus</i>	White ibis Glossy ibis

The Birds and Mammals Reported from the St. Andrew Bay Estuary

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Trochilidae	<i>Archilocus colubris</i>	Ruby-throated hummingbird
Troglodytidae	<i>Cistothorus palustris</i> <i>Cistothorus platensis</i> <i>Troglodytes aedon</i> <i>Thryothorus ludovicianus</i>	Marsh wren Sedge wren House wren Carolina wren
Tyrannidae	<i>Contopus virens</i> <i>Myiarchus crinitus</i> <i>Sayornis phoebe</i> <i>Tyrannus dominicensis</i> <i>Tyrannus tyrannus</i>	Eastern wood-peewee Great crested flycatcher Eastern phoebe Gray kingbird Eastern kingbird
Vireonidae	<i>Vireo flavifrons</i> <i>Vireo griseus</i> <i>Vireo olivaceus</i> <i>Vireo solitarius</i>	Yellow-throated vireo White-eyed vireo Red-eyed vireo Solitary vireo

Mammalia

Dr. Gore pers. comm.

Canidae	<i>Canis latrans</i> <i>Urocyon cinereoargenteus</i>	Coyote Gray fox
Castoridae	<i>Castor canadensis</i>	Beaver
Cervidae	<i>Odocoileus virginianus</i>	White-tailed deer
Cricetidae	<i>Oryzomys palustris</i> <i>Peromyscus polionotus allophrys</i> <i>Peromyscus polionotus penninsularis</i> <i>Sigmodon hispidus</i>	Marsh rice rat Choctawhatchee beach mouse St. Andrews beach mouse Hispid cottonrat
Dasypodidae	<i>Dasypus novemcinctus</i>	Nine-banded armadillo
Delphinidae	<i>Tursiops truncatus</i>	Bottle-nosed dolphin
Didelphidae	<i>Didelphis virginiana</i>	Virginia opossum
Geomysidae	<i>Geomys pinetis</i>	Southeastern pocket gopher
Leporidae	<i>Sylvilagus florianus</i> <i>Sylvilagus palustris</i>	Eastern cottontail Marsh rabbit
Muridae	<i>Rattus norvegicus</i> <i>Mus musculus</i>	Norway rat House mouse
Mustelidae	<i>Lutra canadensis</i> <i>Mephitis mephitis</i> <i>Mustela frenata</i> <i>Mustela vison</i> <i>Spilogale putorius</i>	River otter Striped skunk Long-tailed weasel Mink Eastern spotted skunk

The Birds and Mammals Reported from the St. Andrew Bay Estuary

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Procyonidae	<i>Procyon lotor</i>	Raccoon
Sciuridae	<i>Glaucomys volans</i> <i>Sciurus carolinensis</i>	Southern flying squirrel Eastern gray squirrel
Sirenia	<i>Trichechus manatus</i>	Manatee
Soricidae	<i>Blarina carolinensis</i>	Southern short-tailed shrew
Talpidae	<i>Scalopus aquaticus</i>	Eastern mole
Vespertilionidae	<i>Eptesicus fuscus</i> <i>Lasiurus borealis</i> <i>Lasiurus intermedius</i> <i>Lasiurus seminolus</i> <i>Myotis austroriparius</i> <i>Nycticeius humeralis</i> <i>Pipistrellus subflavus</i> <i>Tadarida brasiliensis</i>	Big Brown Bat Red Bat Yellow Bat Seminole Bat Southeastern Bat Evening Bat Eastern Pipistrelle Brasilian Free-tailed Bat

1000

1000

1000

1000

1000

1000